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A.M.A. ARCHIVES OF OTOLARYNGOLOGY

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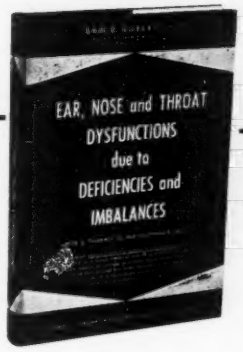

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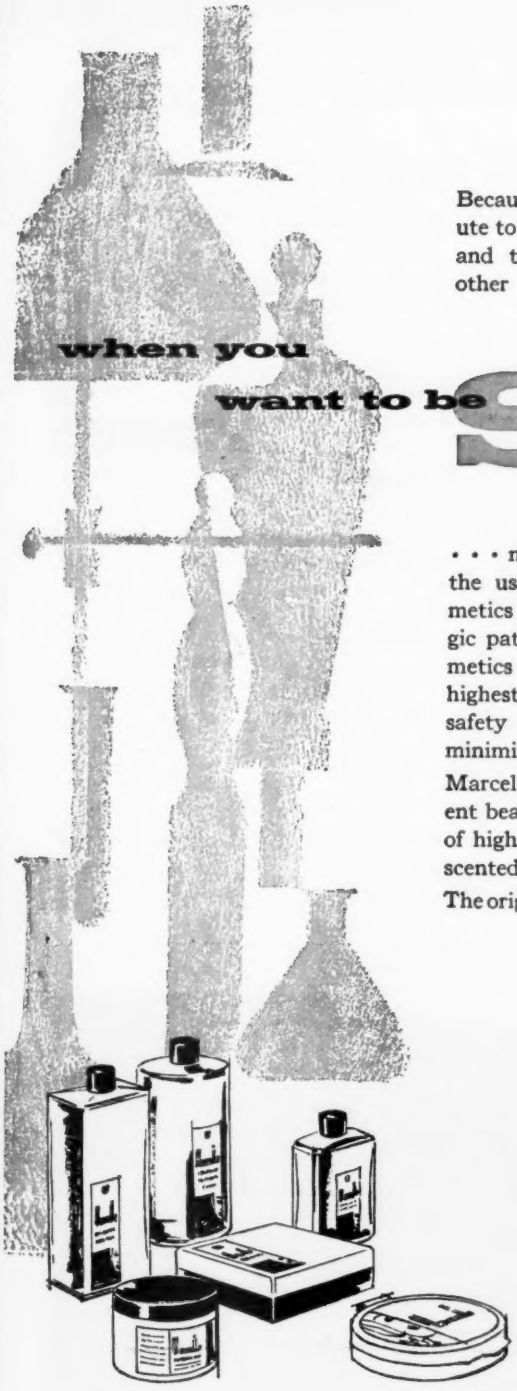

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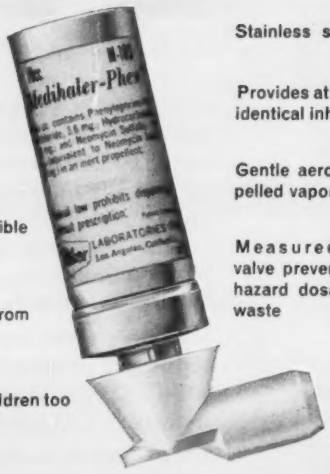

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Editorial Note

In accepting Dr. Esti D. Freud's paper, "Voice and Breathing: A Report on Some New Concepts," we realized that some of its contents were very controversial. However, we hoped that the paper might stimulate research on a phase of otolaryngology in which there is much to be proved.

Dr. Freud reports on the research of Professor Piquet, Dr. G. Decroix, Dr. R. Husson and Dr. A. Moulonguet, who present an entirely new theory of vocalization. In this, the myoelastic theory, vocalization is held to be the product of central cerebral action on the recurrent laryngeal nerves, which thus produces the vibrations of the vocal chords. This new theory is strongly opposed to that to which most otolaryngologists have long subscribed.

According to long-accepted theory, during phonation the thyroarytenoid muscle, which is in a state of chronic contraction, is made to vibrate by the expiration of air from the trachea. The pitch of the tone depends on the degree of contraction of the muscle.

Before the old concept of voice production can be supplanted by so abrupt a departure as the myoelastic theory, much research must be done. Dr. Freud's point that vocalization is only one of the functions of the larynx has long been known.

ERNEST M. SEYDELL, M.D.

Voice and Breathing

A Report on Some New Concepts

ESTI D. FREUD, Ph.D., New York

In the famous Italian singing schools, breathing and Breath control was thought to be of paramount importance to vocal art. The guiding conviction has always been, "chi ben respira, ben canta." According to our present-day knowledge the statement should be reversed into, "chi ben canta, ben respira." The aim of this paper is to report and to discuss those investigations which attempt to prove that this latter affirmation is the physiologically correct one.

During the 10th International Congress of Logopedics and Phoniatrics in Barcelona (September, 1956) a very remarkable motion picture was presented to the members of the convention. It summarized the results of a research project carried out by the staff of the E N T Clinic at the Medical School of the University of Lille (France) under the direction of Professor Piquet. The film showed beyond doubt that vocal cords *do vibrate* in the absence of an exhaled current of air and that subglottic variation in pressure modified the intensity of the sound, but was not the source of a change in its pitch or frequency. According to Dr. G. Decroix, who produced the motion picture, the vibrations of the vocal cords seemed to be goverened by excitations deriving directly from the recurrent laryngeal nerve.

Accepted for publication April 16, 1957.

Some Aspects of the Vocal Organ

If one studies carefully the anatomic-physiologic structure of the human vocal organ, one becomes convinced that nature has not endowed man with a special organ for voice emission.[1] The eye has been created for visual perception. This organ is exclusively designed for the performance of this purpose. A series of anatomic structures in the ear have no other *raison d'être* than to transmit auditory stimulation. As to the vocal organs, conditions are of quite a different nature. The apparatus which is responsible for voice production was originally designed for tasks as vital as respiration and alimentation.[2] Their services as phonatory organs are needed only occasionally and are of secondary importance. Phylogenetically, the entire structure including the larynx, did not entail vocal performances. One has to keep in mind that the primordial task of the larynx is a respiratory one; besides being also a protector for the lungs, it serves as support for the thoracic muscles in order to facilitate the motion of the upper extremities. Its third task only is phonation, and this constitutes the final step in the development of the larynx. Voice emission supposedly followed in the wake of the appearance of some new neural centers, which eventually were brought about through modifications in living habits of some animals. Thus we have to assume that phonation is a secondary functional adaption grafted on a mechanism originally not intended for it. The lungs, the larynx, and the oronasopharyngeal tube represents not at all a sensory-motor unit exclusively created for the purpose of phonation; they are but a conglomerate of sensory-motor associative pathways. On occasion these organs may be used for phonation by means of coordinations, which, however, are superimposed onto the original anatomic structure. Only if one becomes aware of the above-mentioned varied functions of the larynx and is able to keep them apart, is one prepared to face a series of new problems and the effect they will have on voice pathology and therapy. So far that has not occurred; on the contrary, until very recently, the nonphonatory functions of the larynx have been confused or identified with phonation.[3] According to the most recent investigations one may take for certain that human voice production or singing is localized in central nervous system structures. In spite of the fact that dogs and cats have a voice organ very similar to the human one, they are not capable of singing or speaking. The French physiologist Husson,[4] who evolved most of the new theories on voice production, does not hesitate to reaffirm the seemingly trite statement: "Avec son larynx, l'homme est susceptible de faire du bruit; il parle et il chante avec son cerveau."

Husson's Observations on Silent and Vocal Breathing

Husson described the dual function of the vocal apparatus as follows: The organs which participate in phonation, are, so to speak, coupled onto the breathing mechanism; they have a twofold function, inasmuch as by means of a single, integrated innervation they have to perform breathing and phonation. This double function is the cause of a series of manifestations which make it very hard to isolate those parts intended to perform the act of phonation, a role which frequently is in antagonism to the function of respiration. Husson quotes a number of authors, who as early as the last century mentioned the physiologic contradiction that the closing of the glottis—a process necessary for phonation—prevents inhalation. The very same authors, according to Husson, observed the pathologic antagonism that a dyspneic affection is a totally different disease from aphonia or voice loss.

Other examples of such antagonisms are the following: Complete closure between the velum and the pharyngeal wall is one of the essential requirements for optimum voice production. However, it is this very closure which prevents nasal breathing.

The constriction of the laryngeal sphincter which usually goes hand in hand with contraction of the pharynx is detrimental for the production of high tones.[5] Again, however, the best voice is produced when those muscles which raise the masseter are in a state of relaxation, in spite of the fact that these muscles, too, in coordination with the pharynx and the larynx, have the tendency to contract. Vocal training consequently has to eradicate a number of innate synergies and is obliged to construct new ones in order to enhance the quality of the voice.

There is a further distinction between silent and vocal respiration, inasmuch as the former is controlled by the respiratory centers located in the medulla and in the pons. Although most of the time the cortex is completely oblivious of the act of breathing, the cerebral cortex has to take over the control of the respiratory system as soon as vocal art is at stake.

One has to bear in mind that singing demands a certain amount of subglottal pressure; this pressure has to be maintained for a certain amount of time; hence it will be these two factors which determine the exhaled air current. It is obvious that this mechanism is executed by different neural coordinations than those which regulate silent breathing. As previously mentioned, the larynx was originally part of the organ of respiration and thus is susceptible to a number of reflexes transmitted from the mucous membrane of the entire respiratory system. The reflex mechanism of the larynx mainly consists of abduction and adduction. Some of these reflexes are innervated by the sympathetic nervous system and influence the tonus of the principal laryngeal muscles.

The multitude and the variety of these reflex phenomena which may have inhibitory or excitatory effects modify phonation to a certain extent and seriously impair the study of the "voice organ" which per se is part of the respiratory system. In spite of these obstacles, all their manifestations should be carefully investigated.

Are the Vibrations of the Vocal Cords Independent of the Breathing Mechanism? The classic explanation concerning the production of the human voice was formulated as follows: The exhaled air current not only is the driving force which effects the vibrations of the sound-producing mechanism—the vocal cords—but also is its sound-carrying medium.[6] Phoneticians all over the world believed until very recently in the correctness of this statement. These faulty assumptions were the consequence of experiments made under more or less artificial conditions. Results of investigations made on the human cadaver or on an artificial larynx were carried over to the living person. Thus the paramount role played by the central and peripheral nervous system had so far been completely neglected. It made any fundamental distinction between singing and speaking inconclusive.[7]

It was Husson who eventually broke the magic circle of the so called "myoelastic theory." His observations and the experiments carried out by the medical schools in France made it inevitable to substitute for the myoelastic theory the neurochronaxic, cerebral interpretation. Husson started his investigation with the assumption that the vibrations of the vocal cords are not a product of a peripheral air current but are of central encephalic origin.

One of the results of Husson's numerous experiments is evidence of the phenomenon that the neurorhythmic impulse made by the recurrent laryngeal nerve on the transverse fibrils of the thyroarytenoid muscle produces wave-like contractions in this muscle. During each vibratory phase the vocal cords are separated, and the pressure of the expiratory air current contributes to increase the amplitude of the separation. The approximation of the vocal cords is carried out by means of an elastic tension of the longitudinal fibers of the cords, which are in a state of tetanic contraction. Each vibratory phase of the vocal cords is at each period induced by an active tension of the recurrent laryngeal nerve; the frequency of the vibrations is indeed regulated by the

neural rhythmic transmitting influx of the recurrent nerve. The neural transmission of the recurrent nerve is effectuated through the rhythmic impulse of the neuromotor nuclei which ascend the corticorecurrent tract. The larynx, during phonation, functions as a kind of dispenser of periodic excitations, each period determined by the recurrent nerve. Duration and maximal amplitude of the glottic rim are increased by intrapharyngo-oral pressure and by impedance reflected from the supraglottic cavities. Both modify the output of the glottis. Thus, in accordance with this newly gained knowledge, one cannot any longer compare the human larynx with a cushion pipe.

The first one who attempted to prove experimentally Husson's statement was Laget,[8] who in 1953 succeeded in producing vocal cord vibrations without air current, simply by electric iterative excitation of the recurrent laryngeal nerve in situ in an anesthetized dog. Simultaneously the responses in the larynx were watched by means of a stroboscope. If Laget's result first brought confirmation of the neurochronaxic and cerebral origin of the vibrations of the vocal cords—although his observations were limited to the experimental animals—it was eventually Moulanguet[9] who made the decisive experiments on a human patient. Moulanguet summarizes the report on his experiments as follows:

"In the course of the first phase of a total laryngectomy operation at the Boucicaut Hospital in Paris, conducting electrodes were put on the patient's recurrent laryngeal nerve and connected with a highly sensitive microphone before the patient's mouth; the patient was then asked to emit sounds. While the patient made attempts at phonation, the recurrent potentials of action and the vibrations of the voice were directed to a double tracing cathodic oscillograph. The recordings were photographed. They show that at every moment the recurrent potentials of action have rigorously the same rhythm as the vibrations of the voice. The electric activity gathered from the recurrent nerve should not be interpreted as a microphonic effect any more than as a return of proprioceptive impulses. It is established in fact that the potentials of action often appear some hundredth of a second before the vibrations of the voice."

This second experimental proof of Husson's theory is important insofar as it gives decisive evidence that human voice production has its origin in neurophysiologic and especially in cerebrophysiologic processes.

It is inevitable that these new discoveries carry in their wake a radical change of our concept as to the relationship between the vibrations of the vocal cords and breathing. One has eventually to concede that the exhaled air current is by no means instrumental in creating the vibrations of the vocal cords, but only its sound-carrying medium. Subglottal air pressure, the average air volume needed for phonation, and the effects of the breathing motions are questions which still wait to be answered.

Fundamental Differences Between Speaking and Singing.—The neurochronaxic cerebral theory not only stresses the difference in the respiratory technique during speaking and singing but also includes a physiological explanation for it. Speaking and singing are two distinct physiological phenomena; paradoxically, however, they are executed by identical sensory-motor neural association pathways.

The factors through which the difference between the singing voice and the speaking voice manifest themselves are different vibratory patterns of the vocal cords and a contrasting muscular coordination in the oropharyngeal tube; the most obvious difference, however, can be found in the breathing mechanism. For singing, it is the subglottal pressure, the duration and maintenance of this pressure, which determine the motion for in- and exhalation. For speaking, on the contrary, the subglottal pressure is weak, frequently repeated, and the exhaled air volume is to a great extent

utilized for the enunciation of the speech sounds.

Not much energy is needed for the act of speaking. There is not much awareness of internal tactile sensations, and it is difficult to localize them. Compared with speaking, the energy needed for singing is tremendous, causes vivid internal sensations which can be localized exactly. The spot in the oral tube where these sensations may be localized varies with the vowel and the pitch of the tone.

In the same person, according to Husson, the characteristics of the singing and the speaking voice may even be of contradictory nature; thus tenors may prefer a deep speaking voice, while bassi may use a relatively high voice for speaking. Professional singers who are endowed with a voluminous singing voice may have a rather modest speaking voice, or vice versa. It so happens that this kind of disassociation may also be observed among many of the pathological dysfunctions. Thus stutterers rarely evidence any disturbance when they sing; neither do persons who suffer from phonasthenia manifest any stuttering symptoms.

I have recently treated a patient who had been afflicted with a nearly complete expressive (motor) aphasia. Interestingly enough, he could sing "La donna È mobile" and a series of popular songs, melody and words included.

Husson eventually expounds the fact that laughing and crying are also two opposite modes of expression, which, however, are exteriorated by means of identical muscular synergies. In spite of the fact that voice production for singing and speaking are executed by the identical organic mechanism, per se it is carried out by means of basically different neural coordinations, which, however, were achieved on identical sensory-motor association tracts.

These associations are spread out over large areas of the central nervous system, including the bulbar level (excitation of the fifth and eighth cranial nerves), the hypothalamic level, where feelings and emotions are localized, the thalamic level with sensations in general, and the cortical centers, including the motor centers of the 10th nerve and the very important auditory centers in the temporal lobe. In man, the speaking voice is predominantly controlled on the diencephalic level. At this occasion it might be worth while to mention that the entire vocal production of higher animals is confined to this level. The pitch of man's speaking and singing voice is cortically regulated, and it is the cortex which controls conscious expressions of emotions.

The tone intervals prescribed by the melody of a song probably suppress the predominant control on the diencephalic level in favor of regulation by cortical centers. Speaking and singing are innervated from different cortical centers, a fact which explains why the stutterer is able to sing fluently and why the phonasthenia of a singer does not manifest itself when the singer speaks. Just as one has to distinguish between the physiology for laughing and the physiology for crying, one has to learn to make the distinction between the physiology of the speaking voice and the physiology of the singing voice. It has been only very recently that the science of voice physiology has progressed to the stage where these differences were recognized and understood. Previous publications in the field contain mistakes and contradictions.

Breath Control and the Performing Artist.[10]—A professional singer or an actor (lecturer, minister, etc.) who performs in a theater or concert hall is, as the result of his activity, exposed to a number of sound phenomena. First of all, he is subjected to the impedance effect, a sensation which emanates from interoproprioceptive stimulations. Furthermore, he is exposed to cochlear-recurrent impulses which are conveyed by external auditory stimulations. Under certain circumstances one or the other of the two kinds of sensations may become of predominant importance and influence the artist's voice production.

The impedance effect—resonance phenomena—reflected into the larynx from the supralaryngeal tube (*Ansatzrohr*) obstructs the vibrations of the vocal cords. This effect is elicited by resonance developed in the pharyngeal, nasal, and oral cavities. It is the impedance which determines the subglottal air pressure necessary for the maintenance of a continuous, regular sound wave.

Husson examined the impedance effect by means of the stroboscope. He discovered how sensitive the larynx is for even the slightest decrease of impedance. Husson observed that any decrease of the latter is immediately followed by a contraction of the glottic sphincter in order to secure the balanced stability of the exhaled air column. Every vocal artist has during voice emission, in his oral cavity, in his pharynx, in his larynx, a number of well-localized sensations. These localized sensations during voice emission have been well known for a long time. They have been described and empirically delimited by the late Lily Lehmann, the world-renowned singer. The spots for these localized sensations differ a great deal even among the same individual. The same artist experiences different places of localization. Their position varies according to the vowel, whether the vowel is open or closed, and ultimately it is the pitch of the tone produced which influences the position of the sensations.

The nervous transmission for these proprioceptive sensations are conveyed through impulses from the trigeminus, the vagus, and the glossopharyngeal nerves. Husson arrived at these conclusions by means of autoexperimentation. He cocainized different points in his own oral cavity. As an unexpected result of his experiments, Husson discovered that the modulation and timbre of the voice are not regulated by the ear, but in accordance with the individual's interoproprioceptive sensations.

Husson concludes that the principal goal to strive for in training a vocal artist should be to evoke, to place, and to strengthen those interoproprioceptive sensations during voice emission by means of which the artist may attain optimum vocal quality. Respiratory motions have to be synchronized with and modified according to the effects of laryngeal impedance.

Summary and Conclusions

R. Husson's important contribution to voice physiology carries in its wake a revised physiology of the function of the vocal cords. He and his collaborators have proved beyond doubt that the process of vibration of the vocal cords is not a purely peripheral phenomenon, a result of elastic potentials intrinsic to the vocal cords per se following an interplay of certain forces, but is part of cerebral physiology. Rhythmic impulses of central origin transmitted by the recurrent laryngeal nerve determine the frequency of the vibrations of the vocal cords.

In addition, it has been established that adduction and vibration of the cords are independent of each other; it is possible to obtain closure of the cords without vibrations and vibrations without closure. These two processes may be disassociated by pathologic conditions. It is possible to observe adduction paralysis without vibratory involvement and vibratory dysfunction without damage to adduction. Adduction of the vocal cords belongs to the respiratory function of the larynx, whereas vibration of the cords forms part of its phonatory function.

Our knowledge concerning the mechanoauditory coupling of the larynx with his resonators, the naso-pharyngeal-oral tube (*Ansatzrohr*) has been greatly advanced. The maintenance of the pitch, timbre, and quality of the voice is to a certain measure only regulated by the ear. Of decisive importance are the efferent regulations following interoceptive and proprioceptive sensations. These sensations may be precisely localized in the supralaryngeal tube. The central, efferent regulation is elicited by the impedance effect—a resonance phenomenon in the larynx—and influences the subglottal air pressure. It is this process

which determines the emission of the smooth, even, well-balanced voice of the vocal artist. The above-described process is limited to singing. The pitch of the speaking voice is usually unconscious and not controlled by cortical centers; it has to be localized in the mesencephalon. The expression of emotions may be evoked from thalamic or bulbar regions. In accordance with these assumptions, one has to distinguish between a physiology of the singing voice and a physiology of the speaking voice.

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Principles of Cancer Surgery Applied to Cancer of the Larynx and Hypopharynx

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Introduction

The literature is full of examples of almost identical papers appearing almost simultaneously in journals of widely separate countries. The easy interchange of ideas afforded by modern air travel may be a possible reason, but I think the true reason is a logical development of thought becoming canalized into certain well-defined channels by the development of the accessory aids which are our necessary instruments. Although a good deal of what I am about to say has gradually arisen in my own practice, modified and revised by personal contacts with my immediate colleagues, most of it is quite familiar to all of you, and I claim almost nothing of originality in the sense of unique discovery.

General Problems of Cancer Treatment

Excision and Irradiation.—The treatment of a malignant growth is a choice between excision or irradiation—sometimes a judicious combination of the two. Nobody can pretend that this is a desirable state of affairs, but at the present time there are no other means available except in a few specialized types of tumor. Success is often claimed for these crude methods of extirpation, meaning the failure of the growth to recur in any recognizable way during a period of observation, and most surgeons more cautiously use the phrase "freedom from recurrence," tagged with a specified number of years.

The technical possibilities of surgery have been immensely extended by advances in anesthesia, in the antibiotic control of infection, in the avoidance and treatment of shock, and in social and physical rehabilitation. It seems not so long ago, although it is more than 20 years, that I was Wilfred Trotter's house surgeon, assisting him with the operations he devised and performed with deceptively facile but matchless skill. But even he could never overcome the challenges of wound contamination and pulmonary infection due to the organisms in the pharynx, and to the ether and chloroform anesthesia of the day. Although most of his cases survived the postoperative period, few avoided hourly dressings of phenol compresses, or a purulent bronchitis, often bronchopneumonia, which persisted for weeks. Some years later, when I was Lionel Colledge's assistant, the same problems recurred. The success these men achieved depended largely upon their superb technical abilities and precise and gentle operating based on a profound knowledge of anatomy. The foundations of our craft, so well and truly laid by these and other masters of it, are now carrying a superstructure which would have amazed as surely as it would have delighted them.

At the same time, the techniques of irradiation have also progressed. Increasing power of concentration and penetration, coupled with increasing precision, are being wielded with the finer judgment conferred by critical experience and meticulous observation.

Training and Judgment.—When any operation for cancer is advised, and especially

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one of magnitude involving deformity, there are aspects to be considered which may be overlooked in the excitement engendered by technical virtuosity, or perhaps unwittingly disregarded in the objectivity inseparable from the accumulation of statistics. Problems in ethics and in common humanity arise and are often more knotty than the problems of whether to operate or whether to irradiate. The more radical and mutilating the surgical procedure conceived, the more acutely must the perceptions be tuned to the mental reactions of the patient, whilst a blunt appraisal of our own capacity is equally essential. Life can sometimes be more miserable than death, and it is quite unjustifiable to inflict a severe and disabling operation upon a patient unless one feels capable of completing it successfully and unless there is a good chance of a reasonable survival period and a sufficiency of physical well-being with which to enjoy it. A fundamental integrity and much judgment are needed to estimate this position. The latter can only be acquired by long experience in a subordinate capacity and under supervision.

Above all, the requisite facilities must be available, and it is axiomatic that the nursing and accessory rehabilitation services must be capable of supporting the actual surgery.

Some of the most heart-searching problems occur in cases where the growth is well advanced when first seen. The phrases "technically operable" and "bold surgery" are ones we should dread to hear applied if we were the patient, so well do we know what they portend—that in fact they are a cloak to conceal our helplessness. It is not really "bold" to perform a "technical" excision which is foredoomed to failure, if this procedure is to make the residue of life even more unbearable.

Glottic Carcinoma

In applying these general principles to our special problems it cannot be overstressed that early diagnosis is fundamentally important. Unfortunately, except in the glottic region, the discovery of a growth is apt to be later in the natural history than desirable, but any lesion of the vocal cord, even one the size of a pinhead, causes hoarseness, immediately apparent and persistent. This, coupled with the anatomical peculiarities of lymphatic supply which limit local and metastatic spread, has greatly facilitated the treatment of glottic growths. In fact, in no other area of the body is the prognosis so good, provided there is no cervical metastasis, whether treatment is by surgery or by modern irradiation.

Laryngofissure.—The virtues of a local excision of a limited cordal growth have been extolled for many years by Sir St. Clair Thomson in Britain and by Dr. Chevalier Jackson in this country, and the example they set we still gladly follow. There can be no doubt that in the right case laryngofissure is a most successful operation, leaving little disability and having a low rate of recurrence.

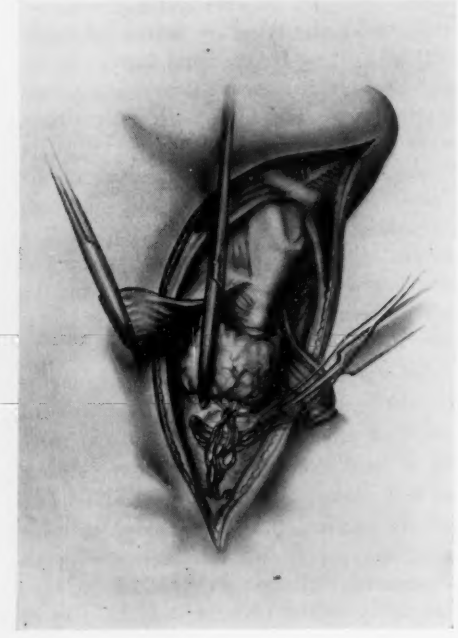
Partial Laryngectomy.—When the growth has extended too far for so restricted an excision and when surgery has been selected as the treatment of choice, the alternative lies between the types of partial laryngectomy advised by Hautant and further developed by Leroux-Robert (1956), and a total laryngectomy. The former procedures have never been as popular in Britain as in France, and increasingly nowadays in the United States of America, and, although ingenious, they seem to leave too small a margin of safety. The larynx conserved is often not very useful, scarcely justifying the risk of recurrence entailed in its preservation.

Laryngectomy.—A total laryngectomy is unquestionably the surgical treatment of choice of any glottic growth too extensive for a local excision and without palpable cervical nodes. There are several reasons for its success, the chief being the poor lymphatic supply of the region with its consequent limitation in local spread and metastasis to the neck, whilst the size of

the organ compared with the size of the growth automatically ensures a wide margin of healthy tissue. In fact, it is so good an operation that an unsafe conservatism has been noticeable in its performance, possibly induced by the fear of pharyngeal sepsis and the complications of inhalation anesthesia. The "narrow field" technique (Jackson and Jackson, 1939), and the subperichondral excision technique (Crowe and Broyles, 1938) were useful and ingenious compromises at a time when pharyngeal fistula was not infrequent. However, neither is a valid cancer procedure, for they demand not only a wide margin of healthy tissue round the growth, but elimination of possible paths of lymphatic spread.

The fascial coverings of the muscles attached to the larynx are areas of lymphatic drainage, and the external perichondrium is in continuity both with these coverings and with the membranes connecting the laryngeal cartilages. Thus the larynx must be excised

Fig. 1.—Laryngectomy. Sternothyroid muscle divided at the sternum. Preparing for the excision of the thyroid isthmus. (From Operative Surgery, by permission of the publishers, F. A. Davis Company, Philadelphia.)



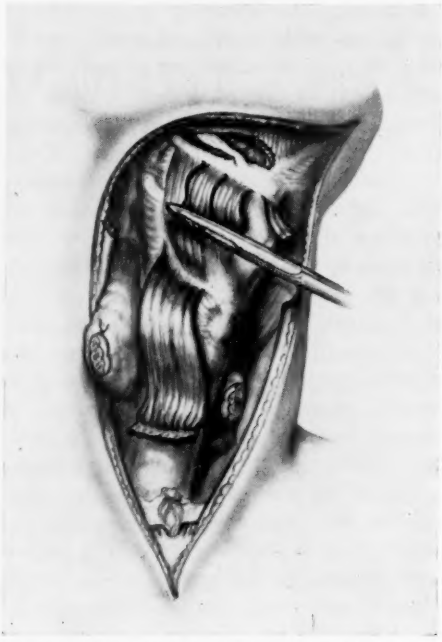


Fig. 2.—Laryngectomy. Partial excision of the sternohyoid muscle (and omohyoid muscle) and beginning of dissection of hyoid bone. (From Operative Surgery, by permission of the publishers, F. A. Davis Company, Philadelphia.)

with all the muscles attached to it in their entirety, especially those attached to the thyroid cartilage. The sternothyroid muscle must therefore be divided at its sternal end, and not along the oblique line of the thyroid cartilage (Fig. 1). Generally speaking, the sternohyoid muscle should also be severed at its sternal attachment, but the inferior portion of this muscle is so remote from a glottic growth that a compromise is justifiable. The upper half or one-third only need be removed, leaving the remainder in the skin flaps to help in their nutrition (Fig. 2).

The thyrohyoid muscles must be removed completely. Excision of the hyoid bone is thus essential in order to achieve the complete excision of the sternohyoid and thyrohyoid muscles (Fig. 3).

Furthermore, removal of the hyoid bone also results automatically in the excision of the preepiglottic space (Fig. 4), a most important area of lymphatic drainage, which

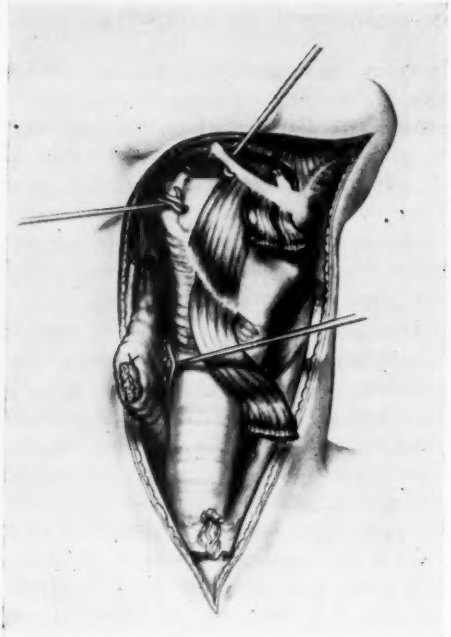


Fig. 3.—Laryngectomy. Excision of hyoid bone and thyrohyoid muscle. (From Operative Surgery, by permission of the publishers, F. A. Davis Company, Philadelphia.)

Fig. 4.—Laryngectomy. Line of incision, to show removal of preepiglottic space. (From Operative Surgery, by permission of the publishers, F. A. Davis Company, Philadelphia.)

Fig. 5.—Laryngectomy. Excision of the pyriform fossae. (From Operative Surgery, by permission of the publishers, F. A. Davis Company, Philadelphia.)

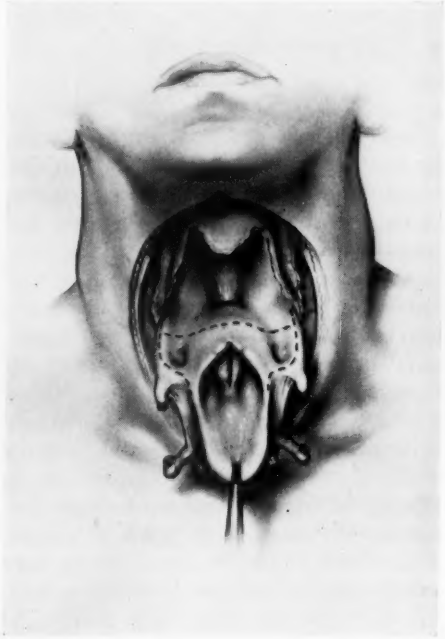


Fig. 6.—Laryngectomy. Excision of the upper three or four rings of the trachea. (From Operative Surgery, by permission of the publishers, F. A. Davis Company, Philadelphia.)

should always be included in the laryngectomy. This also applies to the pyriform fossae (Fig. 5).

Finally, if the growth gets on to the under surface of the cord, there is always the possibility of spread down the trachea by the longitudinally running lymphatic trunks, and for this reason it is safer always to excise at least the upper three rings of the trachea (Fig. 6).

The technique of this extended excision is not really more difficult than more restricted ones, and the subsequent disability is unchanged. The margin of safety, however, is immeasurably increased.

Supraglottic and Subglottic Carcinoma

The presenting symptoms of hoarseness or dyspnea occur relatively late in the natural history of supraglottic and subglottic growths, which, when first seen, may be in an advanced stage. There are often palpable cervical metastases, and always the possibility of these metastases as a looming threat.

Although irradiation therapy has improved (Lederman, 1956), the results are still far from pleasing, and surgical excision may offer better prospects, if comprehensively planned and meticulously performed, and when there are no palpable cervical nodes.

Supraglottic cancer tends to be malignant and invasive, and the surgical excision must be wide or is better left undone. Some of the indifferent results seen in these cases may be due to restricted excisions, successful enough for glottic cancer but quite inadequate in this group. All the points already made apply with even greater force here, and no hedging is possible without failure, which is in any event always round the corner. The preepiglottic space is a vital area which must be excised, and the whole sternohyoid muscle together with a good length of the omohyoid muscle must be included in the excision.

Recurrence deep in the neck, or in the resutured pharynx, is rare after excision for glottic cancer. It is occasionally seen, however, in supraglottic cancer. I believe this to be due to spread in the inferior constrictor muscle, which is usually divided along its attachment to the posterior edge of the thyroid lamina and then used to reinforce the sutured pharynx. It is therefore advisable to resect this muscle as far posteriorly as possible and sacrifice its reinforcement of the pharyngeal repair.

Growths below the vocal cords tend to spread inferiorly because of the longitudinal lymphatic trunks in the subglottic area. It is a real danger, and recurrence in these cases is frequent at the tracheostoma, and even below it. There is no certain way of avoiding this danger, but a low division of the trachea is a measure of protection. The trachea and esophagus are easily separated, and the former should be divided between the fifth and sixth, or even the sixth and seventh rings in some patients. Fashioning the tracheostoma may not be easy, but the skin can be undermined widely and then mobilized sufficiently to stretch down to the tracheal stump. A great deal depends upon the build of the patient.

These points are all based on general principles of cancer surgery, and laryngectomy embodying them will, I feel sure, lead to an improvement in results.

Hypopharyngeal Carcinoma

More difficult problems are propounded by growths of the hypopharynx. Insistent symptoms are even later in appearing than in the previous groups. Owing to the free lymphatic drainage of the pharynx, there is also a still greater tendency to cervical metastasis, which is present at the initial examination in a high proportion of cases. It is customary to divide these tumors into topographical groups deriving from Wilfred Trotter's original classification, namely, epilaryngeal, on the lateral and posterior walls, in the pyriform fossa, and in the postcricoid region. Postcricoid cancer does not really form a single group, as growths in the lower end of the hypopharynx begin as often on the lateral and posterior walls as

on the back of the cricoid cartilage. The results of treatment are not very different in all these groups but tend to be rather worse in the postcricoid or epiesophageal group. Recurrence in the neck is the great bugbear.

For many years the surgical approach was restricted by a desire to preserve the larynx or some portion of it, and Trotter's lateral pharyngotomy embodied this conception. The increasing safety of modern surgery and the improvement in rehabilitation methods, coupled with the poor results of these limited excisions, have led to a noticeable and natural tendency to more radical methods. Lionel Colledge was a great protagonist of this principle and successfully performed many pharyngolaryngectomies.

Wherever the situation of the pharyngeal growth, surgical extirpation should include the larynx with the excised segment of pharynx. Limited pharyngeal excisions, particularly of small growths on the lateral wall, or on the lateral wall of the pyriform fossa, are tempting and are occasionally successful. The greater ease of pharyngeal reconstruction, either by primary union or by secondary repair as described by Trotter, is most compelling. However, the rich lymphatic network of the pharynx must be constantly borne in mind, and a review of these cases will reveal a dismal tale of recurrence at the site or of later cervical metastasis. Inadequate surgery in this field can only lead to disaster, and the mind must be steeled to radical measures. All the problems involved in resecting a complete segment of the pharynx must be faced, together with those presented by the cervical nodes. The surgery is extensive and difficult, demanding knowledge, experience, and fortitude. The pharynx should be removed from above the hyoid bone to as low down in the cervical esophagus as necessary, together with the thyroid gland, the larynx, and one or two rings of the trachea. There is no special reason to resect any more of the trachea, unless it is involved in the growth and a mobile length of it is needed in order to fashion the tracheostoma at a distance from the divided cervical esophagus.

Various approaches can be used, chiefly depending upon the type of pharyngeal repair envisaged. The tendency nowadays is to perform a primary skin graft reconstruction of the pharynx (Reidy, 1952, and Conley, 1953), and large U-shaped or H-shaped incisions are commonly employed, but I prefer the double triradiate incision advised by Hayes Martin (1951). The extended Trotter incision used by Wookey (1948) is best if a secondary reconstruction is in view, provided its vertical limb is sufficiently long to include the longest segment of pharynx likely to be excised. A description of the technique of these reconstructions has been given elsewhere (Ellis, 1957).

Cervical Metastases

The presence of palpable cervical nodes raises only two points: (1) are these nodes operable; (2) are they indicative of metastases elsewhere? If no other secondary growth can be found, it is justifiable to undertake an exploratory operation in an endeavor to excise the cervical metastasis. The usual cases in which this position arises are those of supraglottic and pharyngeal growths. At one time the primary growth was first excised, and at a second operation performed two or three weeks later a block dissection of the neck was undertaken. Sometimes the procedure was reversed, as delayed healing after a laryngectomy or pharyngectomy might delay the gland excision and fatally prejudice the patient's chances. Each operation was a formidable one, carrying in itself a risk of life.

Although the principle of cancerous lymphatic permeation was clearly understood, and experience with cancer of the breast had familiarized surgeons with its importance, it could then scarcely be applied in laryngeal and pharyngeal cases. With the modern improvements in surgical and accessory techniques, excision of the primary and secondary growth en bloc at one operation is now possible, although difficult and

onerous. It is the logical approach, insofar as our limited knowledge of cancer can justify the term, and should always be employed if surgical excision is to be performed.

Supraglottic Growths.—Postoperative follow-up of cases of excision of supraglottic cancer where no palpable cervical nodes were present and where laryngectomy only was performed have revealed a fairly high percentage of cervical recurrence. This has led to the principle of so-called prophylactic gland dissection. I cannot do better than quote the work of Ogura (1951), who found microscopic metastases in the cervical lymph nodes in a high proportion of cases where no nodes were palpable at operation. He includes subglottic growths in his groups of cases for which he advises laryngectomy combined with gland dissection, but I have been more impressed by the frequency of local recurrence in the subglottic group than by cervical metastasis. Ogura's findings and the clinical experience of all of us leave little room for doubting that the neck tissues must be treated as well as the larynx, and the combined operation fulfills the principle of cancer surgery, namely, excision of the primary growth and secondary nodes, together with all the connecting cellular tissue, in one unbroken sheet. There are some who may prefer irradiation of the neck after laryngectomy as their method of prophylaxis, and this is still, I believe, the practice at the Fondation Curie in Paris.

Hypopharyngeal Growths.—Although the potentiality of cervical spread is greater in the pharynx than in the larynx, carcinoma of the pharynx often has a peculiar type of "lag" behavior. It was taught by Trotter that after an excision, although the case has to all intents and purposes remained free of recurrence for four or five years, a cervical metastasis may suddenly appear, whereas a similar period of time after the excision of a laryngeal growth would be an almost certain insurance of cure. This behavior does not seem to be related to the site of the growth nor even to its malignancy grading. The phenomenon, however, makes it more difficult to assess the value of prophylactic neck dissection. Nevertheless, following the general principles already enunciated, we are forced to conclude that a combined operation is desirable, if surgery is to be the method of treatment.

Bilateral Neck Dissection.—This is a most disabling operation, and whether the occasional apparent success is justifiable or not is a matter difficult to determine. Bocca (1953) is certain that it is justifiable, but not sufficiently certain to perform the operation in one stage. He advocates a two-stage procedure with three or four weeks between the stages. He also dissects out the accessory nerve from the cellular tissue in order to preserve the function of the trapezius muscles. Both are compromises with the general principle and to that extent are unsound. He justifies them by saying that no obvious cancer is present, and adds that these concessions are not made if there are palpable nodes. Certainly in any pharyngeal growth, or in a supraglottic growth not confined to one side, the neck tissues on both sides must be treated. Whether this should be by a combined primary excision together with a bilateral neck dissection now becomes one of those problems discussed earlier in this paper. Not the least of the relevant data are one's personal attributes and the nursing facilities. To balance this position is the available radiotherapy, and, if it is of high quality, the final and resolving statistical analysis, the "nicely calculated less or more." I find the problem almost insoluble every time I meet it. I am not convinced that primary excision and bilateral neck dissection in one stage should be performed in every case of pharyngeal cancer, because there are some cases who do not develop metastases, or who live for years before doing so. The statistical improvement is scarcely enough to justify the disability, and, if compromise measures such as preservation of the accessory nerve and of the internal jugular vein are taken to avoid some of the disability, statistics become even more un-

reliable. Fortunately, the problem does not occur often, as most of the cases of cancer of the pharynx are advanced when first seen and drastic surgical measures are so clearly needed (or none at all) that doubt disappears.

Palliative Surgery

A brief word should be spoken on the subject of palliation. Irradiation has for long been considered the chief palliative treatment, but the relative safety of modern surgery is extending the scope of possible relief. For instance, the removal of a foul fungating growth by laryngectomy, even if secondary deposits are known to be present, may immeasurably increase the patient's comfort and prove more valuable than a simple tracheotomy. In growths of the hypopharynx the introduction of a Souttar's tube and gastrostomy can alleviate some of the misery of the terminal complete dysphagia, but even so the condition of such patients is pitiable. Excision of the primary growth introduces all the complications of a pharynx reconstruction, and is scarcely a practical measure in these cases. However, the upper, oral stoma can be sutured, and the patient can be fed or can feed himself, through the esophageal stoma. Continual spitting is necessary to get rid of saliva, but this is unquestionably preferable to stenosis due to a large, fungating growth. This method is used at the Memorial Hospital in New York. My colleague Mr. Asherson (1954) has recently devised an ingenious method of ablating the primary growth, using the mucous membrane of the larynx and trachea for the reconstruction. He added as a comment that "had the growth not permitted the separation of the larynx and subglottic trachea from the pharynx, it might still have been feasible, by sacrificing the tracheal party wall, to preserve much of the remaining lumen of the glottis and subglottic trachea to enable it to be used to reconstruct the pharynx, possibly over a portex tube covered with a skin graft." It is possible to take the view that the prognosis in all patients with this disease is so bad that a primary reconstructive operation of this kind is always justifiable as palliation, and that larger excisions are valueless.

Conclusion

I would not wish to end on such a note of despair, and I am sure that surgery has a great part to play in eradicating disease of the larynx. I am less sure about disease of the hypopharynx, but, provided the operations do not increase the patient's misery and provided they are based on proper surgical principles as we understand them today, they must be persisted in, and every endeavor must be made to improve the technique.

149 Harley St., W. 1.

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Conductive Deafness in Children

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Deafness has long presented a challenge to the medical profession. Only recently with the advancement of the antibiotics and the new and improved surgical techniques has the problem of conductive deafness in adults approached a practical solution. This presentation deals with a study directed toward the improvement of conductive deafness in children.

It has been known that some children with this type of impairment are relieved by adenoidectomy while others are not. In cases where a fluid level was observed myringotomy and suction have improved and maintained the hearing. The thought occurred that all cases of pure conductive deafness in children might be attended by middle ear effusion. To determine if this were the case was the purpose of this study.

Serous otitis media is not a new disease, first being described by Politzer [1] in 1869. Since that time numerous titles such as serous catarrh, hydrops of the middle ear, catarrhal otitis media, etc., have been applied to the condition. In a review of the literature Harcourt and Brown [2] stated that in spite of the array of confusing terms all types of the disease fit into one clinical entity. This consists of the following: a collection of clear fluid in the middle ear, chronicity of the affliction, and the noninfectious origin of the fluid. They therefore suggested that the name of hydrotympanum be applied to the disease.

Most authors dealt exclusively with the disease in adults or only mentioned children in their series. However, Suehs [3] felt it was seen much more frequently in children and that the increase in the number of cases since 1940 was probably due to the alertness of physicians rather than actual increase of the disease itself.

Writing on hearing impairment in children, Crowe [4] brought out the fact that serous otitis is a frequent offender and may also be responsible for permanent hearing loss in adults.

The patient who stimulated this study was an 8-year-old white boy. He was first seen in the ear, nose, and throat clinic in March of 1956. The child had had frequent earaches beginning at the age one and continuing to the time he was first seen. There had been drainage from the right ear on one occasion. A previous tonsillectomy and adenoidectomy had been performed at the age of 6 years. Examination of the ear, nose, and throat was negative with the exception of the presence of dullness and scarring of both eardrums. An audiogram revealed a 25 db. conductive deficit (Fig. 1A). Owing to the fact that this was a pure conductive loss with excellent bone conduction, the eardrums were again inspected for signs of a fluid level, but none could be visualized. The thought then occurred that the middle ear cavity might well contain fluid, but no meniscus could be seen because of the previous scarring. At the time of surgery large lateral bands of lymphoid tissue were removed, and

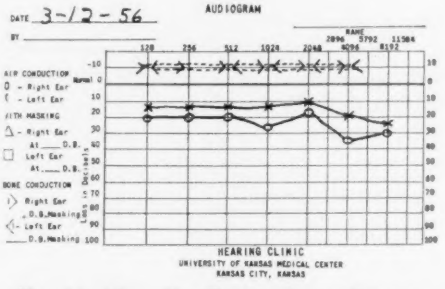

Fig. 1A (Case 1).—Preoperative audiogram.

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From the Department of Otorhinolaryngology of the University of Kansas School of Medicine.

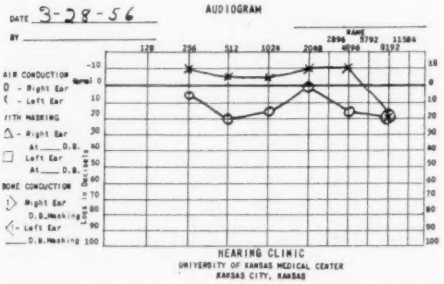


Fig. 1B (Case 1).—Audiogram following adenoidectomy and bilateral myringotomies.

at the conclusion of the procedure bilateral myringotomies were performed. A surprising amount of thick tenacious fluid was obtained from each middle ear cavity.

The next morning the patient volunteered that he heard much better, and this was confirmed by audiogram (Fig. 1B) a few weeks later.

Experimental Method

After observing this phenomenon the decision was made to do bilateral myringotomies on a series of children with conductive hearing losses confirmed by audiologic study, regardless of the condition of the tympanic membranes. Seventy-two such children were included in this series. At the time of surgery the adenoid mass as well as the lateral pharyngeal bands were scrupulously removed under direct vision as recommended by Guggenheim.[5]

At the completion of this procedure bilateral myringotomies were performed and spot suction applied to the myringotomy opening. Repeat audiograms were obtained at the first postoperative visit.

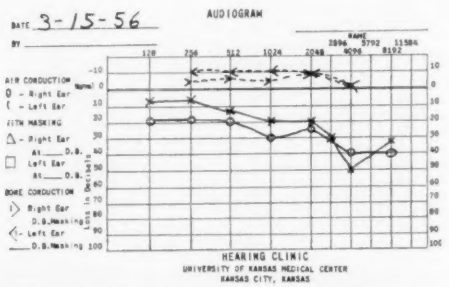


Fig. 2A (Case 2).—Preoperative audiogram.

Results

Without exception each of the 72 children had fluid in the middle ear cavity at the time of surgery, and the postoperative improvement in hearing was equally consistent, for in no instance was lack of significant postoperative hearing improvement apparent.

Figure 2A is the audiogram of an 8-year-old white girl whose complaint was a hearing loss noted at school. The child had had attacks of tonsillitis and frequent earaches. Physical examination revealed the tonsils to be Grade IV enlarged while the eardrums appeared slightly dulled.

A tonsillectomy and adenoidectomy were performed. At the completion of this procedure, both eardrums were incised and a large amount of thick tenacious fluid was obtained. A postoperative audiogram revealed normal hearing (Fig. 2B). An example in contrast was a 5-year-old Negro girl who did not have the benefit of myringotomies at the time of surgery. This patient was seen in the ear, nose, and throat clinic with a history of mouth breathing and occasional earaches of four years duration. Examination of the tympanic membranes revealed them to be dull and diffusely injected. Adenoid tissue was seen in the pharynx. An audiogram revealed a pure conductive deafness (Fig. 3A).

At the time of surgery a large adenoid pad and large lateral bands were removed. Myringotomies were not performed. One month later repeat audiograms revealed no

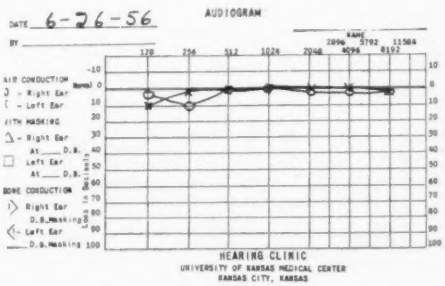


Fig. 2B (Case 2).—Audiogram following tonsillectomy, adenoidectomy, and bilateral myringotomies.

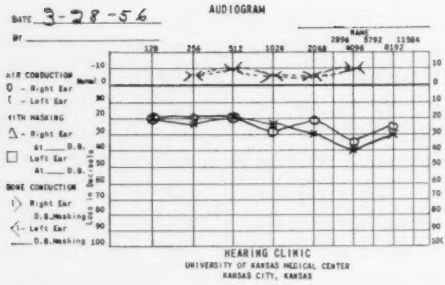


Fig. 3A (Case 3).—Preoperative audiogram.

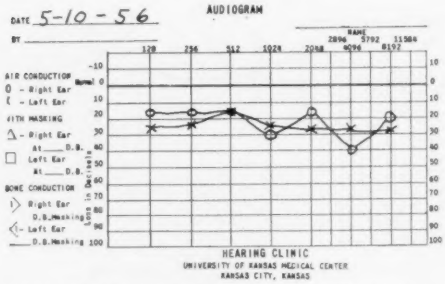


Fig. 3B (Case 3).—Audiogram following adenoidectomy without myringotomies.

improvement in the patient's hearing (Fig. 3B).

Another interesting case was that of a 10-year-old Negro boy whose audiogram revealed a conductive hearing loss in only the right ear (Fig. 4A). Yet, true to form at the time of surgery, although bilateral myringotomies were performed, fluid was obtained from only the right middle ear cavity. Reevaluation of the patient's hearing revealed a marked increase in the auditory acuity of the right ear (Fig. 4B).

Comment

It is interesting to note that the consistency of the fluid obtained at the time of myringotomy varies with the time it has been present. Therefore, early cases yielded thin clear fluid (Fig. 5), while in long-standing ones the fluid was thick and tenacious, stretching out in long strands to the suction tip (Fig. 6). In others the fluid was congealed and had the consistency of jelly (Fig. 7). Robison [6] attributes the characteristics of the fluid to its protein content, which increases with time as the water is absorbed. Therefore, some idea of the duration of the disease can be obtained at the time of surgery simply by observing the character of the fluid obtained. This has been correlated well with the clinical history in the cases observed.

In the event that an early case is encountered with thin clear fluid, it is reasonable to assume that this patient could have been helped by adenoidectomy without myringotomy; however, when the thick tenacious fluid is observed, it can easily be understood why these patients are never relieved by anything short of actual evacuation of the middle ear cavity. Two myringotomy incisions, one to let the air in, the other through which to aspirate the fluid, facilitate the procedure.

The use of suction is extremely important; because not only is the fluid so thick and tenacious that it would not exude spontaneously but the healing of the myringotomy incision is very rapid, the defect being closed in a matter of hours. Robison [6] feels that the incision closes quickly, owing to the char-

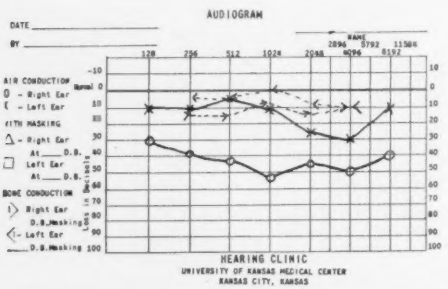


Fig. 4A (Case 4).—Preoperative audiogram of a patient with unilateral conductive deafness.

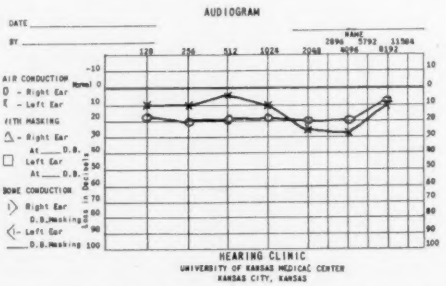


Fig. 4B (Case 4).—Audiogram following adenoidectomy and bilateral myringotomies.

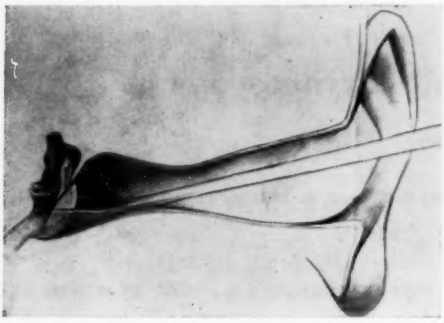


Fig. 5.—Thin clear fluid from the middle ear cavity as found in early cases of serous otitis media.

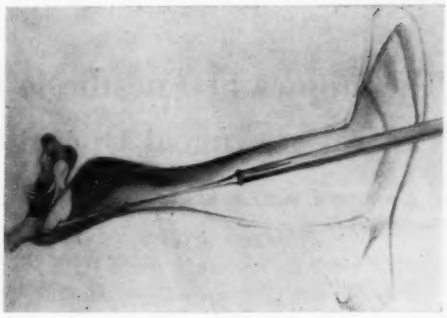
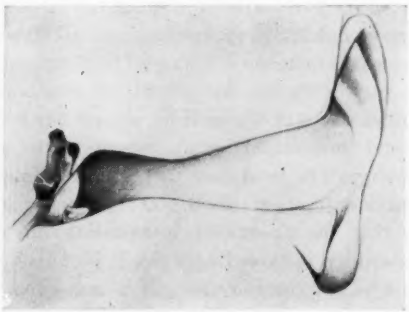


Fig. 6.—Thick tenacious fluid from the middle ear cavity as seen in long-standing cases of serous otitis media.

acteristics of the effusion, which has the viscosity of glue and mechanically fills the opening in the myringotomy approximating the edges perfectly. Furthermore, the high protein content of the fluid affords food for the healing efforts of the fibroblasts and epithelial cells.

Myringotomy at the conclusion of the adenoidectomy or adenoidectomy and tonsillectomy procedure is very easily accomplished and adds little if anything to the postoperative care and management of the patient, while the beneficial effects are rewarding if not dramatic. Complications following myringotomy performed for serous otitis media are almost nil if the operation is skillfully done, and this is easily accomplished under general anesthetics; there is no postoperative pain or bleeding. A small blood clot may be observed at the first postoperative visit but this need not be removed.

Fig. 7.—Congealed fluid may also be encountered in cases of long-standing serous otitis media.



Conclusions

1. The overwhelming majority of children with conductive type deafness are suffering from middle ear effusion.

2. The presence of normal tympanic membranes does not preclude a diagnosis of hydrotympanum.

3. Direct vision adenoidectomy, myringotomy, and spot suction are justifiable and advisable procedures in children with conductive deafness.

Summary

The reason for failure of adenoidectomy in the treatment of conductive hearing impairment in children is presented.

University of Kansas Medical Center (12).

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Techniques of Anesthesia and Laryngoscopy in Peroral Laryngeal Operations

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Peroral operations in and about the larynx, such as taking of biopsy specimens or removal of polypi, cysts, and the like through the laryngoscope, are associated with special anesthetic problems, because oral intubation cannot be applied and accordingly the patient's respiration cannot be controlled in the usual way. The ordinary technique of anesthesia is therefore based on preservation of the patient's spontaneous respiration.

In adults surface analgesia generally fulfills this requirement. It can make the surgical procedure tolerable in many cases, but does not provide ideal operating conditions, as especially nervous patients cannot voluntarily relax the cervical and mandibular muscles. In addition, a necessary immobilization of the vocal cords cannot be secured, even under carefully induced surface analgesia.

In a previously-reported investigation [1] meperidine (Demerol, isonipecaine, Dolantin, pethidine), injected intravenously, was found to have a depressing effect on the laryngeal and pharyngeal reflexes. This effect was utilized for anesthetization prior to esophagoscopy, gastroscopy, and bronchoscopy.[2] In the Finsen Institute it has since also been employed as a link in anesthetization for direct laryngoscopy and peroral laryngeal operations, meperidine medication having here been combined with surface analgesia. In the doses given, meperidine, in addition to its special reflex-depressing effect, brings about a condition corresponding to the general analgesia produced by other anesthetics, e. g., ether or nitrous oxide.

As this combination of surface and general analgesia has been found to give such favorable results that it is now the standard method of anesthesia for direct laryngoscopy and peroral laryngeal operations, the technique as well as the results of its application will be reported here. Further, we shall give a method for general anesthesia which is employed in the few cases where the standard method does not provide satisfactory operating conditions. Finally, an endoscope will be described which is suitable for examination and taking of biopsy specimens in the subglottic space, the anterior commissure, and the hypopharynx.

Technique of the Surface-and-Meperidine Method

The patient must be fasting and have undergone no premedication. Calm patients may be subjected first to surface analgesia with 0.5% tetracaine (Pontocaine) hydrochloride in epinephrine, 1:200,000. Some of this solution is first sprayed into the oral cavity and pharynx, and thereafter 4-5 ml. is dripped on and between the vocal cords. It is commonly stated that 2% tetracaine is necessary for surface analgesia for laryngoscopy, but 0.5% tetracaine proved to be fully satisfactory.

Anesthetization by means of moistened cotton swabs in the piriform recess has been found unnecessary and to offer no advantage. The total dose used of the solution amounts to about 12 ml. (60 mg. tetracaine), so that the chance of intoxication due to absorption is exceedingly small. Not a single case of intoxication was seen in our series.

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From the Finsen Institute, Department of Anesthesiology and Department of Otolaryngology.

Surface analgesia is best induced with the patient in the sitting position, to facilitate application of the anesthetic solution on and between the vocal cords. The patient is thereafter placed on the table, and 50 mg. of meperidine is injected intravenously at a slow rate. After the effect has been observed, the dose is supplemented, slowly and according to requirement, by up to about 100 mg. in the average adult patient. Optimum effect is obtained after a few minutes and lasts for at least 15 to 20 minutes. The total amounts of meperidine given in our series ranged between 80 and 150 mg.

In the cases of nervous patients, in whom surface analgesia may be expected to cause difficulties, we have with advantage injected the first 50 mg. of meperidine intravenously prior to the induction of surface analgesia.

After treatment was concluded, our patients were kept under observation by a nurse until the meperidine action had ceased, never more than about three hours.

The majority of the patients could thereafter resume their daily work. The method can, in other words, be employed to a great extent for outpatient treatment. Oximetric measurements have shown that the patient's oxidation remains uninfluenced by the action of the meperidine. We held N-allylnormorphine and an oxygen mask in readiness, but they were not wanted.

Results

The method has been employed in 258 cases. No complications occurred.

The patients proved to be more quiet and more relaxed than under surface analgesia alone. The patients who had tried both methods all definitely preferred the meperidine method. The patients are able to cooperate during the operation. Thus, for instance, they can intone when requested to. The anterior commissure is easier to survey, because this method allows us, better than surface analgesia alone, to press the epiglottis forward.

As we have several patients with suspected cancer in the Finsen Institute, we have been feeling the need of a laryngoscope for thorough examination of the larynx, especially the subglottic space, and the hypopharynx. An endoscope looking like Robert's esophagoscope has therefore been constructed. It measures 22 cm. in length and has an oval lumen measuring 10 by 14 mm.

In patients with a dental position that might complicate the insertion this endoscope, which is longer and more slender than the usual laryngoscopes, can easily be passed down behind the molars or in a gap in the row of teeth, sometimes by being turned on edge.

The endoscope has been found well suited for examining the subglottic space. The obliquely cut end of the endoscope is passed through the glottis, thus affording a possibility of judging of the extent of the affection. This is of great importance in the planning of possible surgical intervention in the larynx. The endoscope has also been found suitable for examination of the anterior commissure, as it is easier with this than with the ordinary laryngoscopes to "stand" right on the true vocal cords, and even possibly press them a little apart. This yields a good survey of the commissure and easier handling of the biopsy forceps in this place. Finally, the endoscope has been found useful for examination of the hypopharynx, including particularly the floor of the piriform recess, especially when this is narrow and deep.

Method of General Anesthetization Prior to Operation

A few patients were subjected to general anesthetization, because satisfactory conditions of examination could not be obtained by the technique described above. This group comprises 18 patients, of whom some were unable to cooperate during the operation owing to age or mental defects, while the remainder had displayed insufficient relaxation of the pharyngeal muscles after meperidine and surface analgesia for previous laryngoscopy.

Formerly general anesthesia in such cases meant deep ether anesthesia, in which endoscopy and operation were performed during the phase of restitution after application of the anesthetic had been stopped. In cases of prolonged operation it was therefore necessary to intermittently increase the depth of the anesthesia or to maintain the depth by using a technique of insufflation. With these methods of anesthesia the vocal cords will not infrequently react to touch by adduction, or even laryngeal spasms. A depth of anesthesia preventing this reaction will at the same time effect considerable respiratory depression, and thus insufficient ventilation. A too superficial anesthesia will also often cause the patient's cervical and mandibular muscles to be insufficiently relaxed during the operation.

Within recent years general anesthesia with barbiturates, supplemented by relaxants, has been used to an increasing extent for bronchoscopy and operations through the bronchoscope, this having provided ideal conditions for operation. The indispensable oxidation and elimination of carbon dioxide is secured by intermittent artificial respiration via the bronchoscope or by similar measures, which presuppose intubation during the whole period of apnea in the form of the inserted bronchoscope. At direct laryngoscopy and operation in the larynx we naturally do not have this possibility of maintaining the patient's ventilation. Experience gained from treatment of respiration-paralyzed poliomyelitis patients with cuirass respirator has shown that with this form of artificial respiration it is possible to secure satisfactory ventilation for a considerable length of time in suitable patients.

The cuirass respirator consists of a shield, which is placed over the patient's breast and abdomen. It fits tightly to the body by means of an air-filled rubber ring along the border of the shield. The air-filled space between the patient's body and the shield is connected by a tube with bellows, the capacity of which can be altered by the aid of an electric motor. The pressure under the shield is reduced by expansion of the bellows and increased by compression. The pressure variations between patient and shield effect alternate expansion and compression of the thorax, thus allowing an air current to pass alternately into and out of the lungs. By a suitable arrangement, including adjustment of the capacity and compression rate of the bellows, it is nearly always possible to secure adequate artificial ventilation. However, in patients with a fat, flabby abdomen, a short and rigid thorax, or an emphysematous thorax it may be difficult, in some cases even impossible, to obtain effective ventilation with a cuirass respirator. This type of apparatus is also unfit for anesthetized patients with spontaneous respiration, because it cannot automatically follow the patient's respiration.

Technique of General Anesthesia with Curiass Respiration

After premedication with 2.5-10 mg. morphine and 0.2-0.8 mg. atropine about one hour before the commencement of anesthetization, the latter is started by preliminary injection of 300-500 mg. thiopental sodium (Pentothal) intravenously at a slow rate. When the patient is asleep, the cuirass respirator (KIFA respirator) is arranged. A face mask, connected with a respiration bag and oxygen apparatus, is fitted air-tight, and it is controlled so that the respirator gives satisfactory ventilation, estimated on the basis of the variations in expansion of the bag. Next succinylcholine chloride is injected intravenously, beginning with a dose of 60-75 mg. After five or six ventilations with 100% oxygen the vocal cords are anesthetized by spray (tetracaine 0.5% with epinephrine) to prevent irritative coughing and possible laryngospasm after cessation of the effect of succinylcholine.

The patient is now ready for endoscopy and operation. One must, of course, make sure that the respirator functions to satisfaction throughout the procedure.

During the surgical procedure succinylcholine is injected in doses sufficient to main-

tain apnea, about 15 mg. per minute for the average patient. It has rarely been necessary to supplement by thiopental. The patient will generally breathe spontaneously one or two minutes after the conclusion of the operation. The anesthetist must watch the patient during the interval between removal of the endoscope and return to fully sufficient spontaneous respiration.

The method seems ideal with regard to establishing complete immobility of the operative field and total relaxation of the patient's mandibular and cervical muscles, which most often facilitates the work of the surgeon and prevents needless injury to the mucous membranes by the endoscope and other instruments. It may, however, be a disadvantage that the patient cannot, as the waking patient, be made to intone voluntarily. This fact, in association with the complete relaxation of the vocal cords, may render difficult an estimation of the extent of small tumors especially and thus of the exact area to be excised. This is naturally of importance only where benign tumors are concerned. The method requires a rather complex apparatus, which is expensive, and it needs a specially trained anesthetist. Finally, it is, of course, applicable only for patients on whom a cuirass respirator can be expected to have effect. In such cases the method using thiopental and succinylcholine in connection with cuirass respirator affords a possibility of performing the stated operations in a satisfactory way, also when general anesthesia is desirable or necessary. However, as stated above, in the great majority of cases intravenous injection of meperidine combined with surface analgesia gives satisfactory results and is preferable to the more complex method.

Summary

A description is given of the anesthesia for operations associated with direct laryngoscopy.

As standard methods we have employed surface analgesia combined with injection of meperidine (Demerol) in 258 cases, with fully satisfactory results. In a small number of cases—18—the method was found to be less serviceable. These patients were therefore subjected to general anesthesia supplemented by succinylcholine. The ventilation of the patients during this was secured by means of a cuirass respirator. To improve the technique of examination a special endoscope has been constructed.

Strandboulevard 49.

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Serous Otitis Media

Treatment with Injectable Trypsin

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Secretory otitis media has presented problems in its management as evidenced by the reports in medical literature and by our own everyday experience in dealing with this entity.

Many cases of secretory otitis media respond to simple management, utilizing a single myringotomy plus politzerization of the Eustachian tube. However, there are many cases which become protracted, requiring multiple myringotomies repeated frequently; they then become chronic cases of secretory otitis media. Therefore time and the problem of management differentiate the acute from the chronic cases.

Because management of the chronic cases has posed some problems, suggestions have been made regarding their solution. Hoople et al.[1] recommended politzerization in addition to myringotomy. Autoinflation by the patient has been suggested to maintain drainage through the myringotomy wound. Armstrong[2] has suggested the use of an indwelling polyethylene tube inserted through the membrana tympani, where it is allowed to remain until the condition subsides. Elevation of the skin on the posterior wall of the external auditory canal, as is done in the Rosen procedure, and inserting the polyethylene tube in the middle ear rather than by the approach recommended by Armstrong, has been suggested.

Despite the suggested methods of approach, there are reports of cases so treated eventually showing areas of bone destruction in the mastoid necessitating mastoidectomies. Hitschler[3] cited such a case which failed to respond to all these procedures, including the use of a polyethylene tube inserted in the middle ear. A similar condition was observed in a patient of one of my colleagues[4] which followed an identical course despite all of the suggested measures of treatment. At the operating table the mastoid cells were filled with a yellow serous fluid and the mastoid cellular walls were soft and mushy.

Experiences with cases requiring as many as 40 myringotomies before complete subsidence of symptoms have been related. All of us, I feel certain, would prefer not to have to resort to frequent myringotomies. The fewer the myringotomies the better it is for the patient.

Etiology

The etiology of serous otitis media continues in the speculative stage. The concept that it may be viral in origin has not been substantiated. Viral studies of my cases performed at the Virology Laboratory in Philadelphia failed to demonstrate any type of virus.

One of the determining factors in recovery of the patient is patency of the Eustachian tube. Theoretically, if the Eustachian tube is patent, there should be no reason for the accumulation of serous fluid in the middle ear. Here we have an anomalous situation. There must be some drainage and some patency, otherwise these patients would be more uncomfortable—the middle ear would be full—yet in most cases we see a fluid level, and, furthermore, the Eustachian tubes are easily politzerized. However, we cannot deny that there must be some retardation of the flow of serous fluid through the Eustachian tube. It is also possible that factors involved in the produc-

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tion of transudate in the middle ear and the mucous membrane of the mastoid cells produce fluid in excess of what the Eustachian tube can adequately drain.

Since Parenzyme* (pure crystalline trypsin in sesame oil, each cubic centimeter representing 5 mg. of trypsin) had been useful in reducing the ecchymoses and edema in my cases following rhinoplasty, I felt that this agent might be of clinical value in case of serous otitis media. It was conjectured that Parenzyme might affect the cellular production of the transudate, or have a salutory effect on the Eustachian tube so that it would be more capable of handling the flow of the serous fluid.

Clinical experiences with pure crystalline trypsin in sesame oil (5 mg. per cubic centimeter) give evidence to the effect this treatment has on acute local inflammation, edema, and pain. Innerfield et al.[5] concluded that "trypsin is indicated in inflammation regardless of etiology."

That trypsin in sesame oil (Parenzyme) reduces significantly edema of inflammatory disorders is supported by evidence from many sources.[6-9] Patients with pain, redness, and induration at the site of inflammation are relieved by intramuscular trypsin.[10-13]

Certainly, when trypsin is used in direct contact with protein-like substances, it has a digestant effect. However, some investigators[6,14,15] have used trypsin in sesame oil intramuscularly for the mucolytic effect in bronchopulmonary problems with satisfactory results.

Materials and Methods

For the past two years, the following procedure has been followed in the treatment of 106 cases of serous otitis media.

A history survey was obtained and a thorough examination was made in each case. Following the examination a myringotomy was done, the ear politzerized, and the excess serous fluid carefully aspirated from the middle ear through the myringotomy wound. The patient was given 0.5 cc. Parenzyme (2.5 mg. trypsin) intramuscularly in the buttock twice daily for five days. If there was any pathology in the nose or the presence of a purulent discharge, necessary measures were instituted in the treatment. Politzerization was repeated every second day until the ear became clear.

Four patients returned several months later with a recurrence of the serous otitis; however, it can be assumed that these symptoms were not a part of the original process but an entirely new process.

One of the patients gave a history of deafness for a period of two years and had been seen by other otologists during this period. On examination, this patient had no detectable fluid level. However, the appearance was suggestive of fluid filling the entire middle ear. On incision the membrana tympani, a thick gelatinous material was aspirated and the patient improved on this treatment plus Parenzyme. The mucolytic effect of Parenzyme was evidenced by a change in the viscosity of the material within 48 hours. Some deafness remained and the drum had a flaccid appearance after the myringotomy was completely healed.

Four cases of hemosiderosis of the middle ear were seen. The gelatinous type and the hemosiderosis type are probably variants of the classical serous otitis media. In the hemosiderosis type the pathology must be sufficiently severe to produce hemorrhage in addition to the serous transudate, giving it the blue color so characteristic of this condition.

Results

Of the 106 patients in this series 89, or 83.9%, responded favorably to one myringotomy and Parenzyme treatment. In 17 cases, or 16%, a second myringotomy was necessary to clear the ear. All cases responded and were completely free of fluid by the fifth day.

Comment

Cases that come to the operating table for mastoidectomies may be those where the edema of the mucosa at the aditus and antrum may be of such magnitude as to obstruct the flow of the serous secretions from the mastoid cells and thus by hydraulic pressure to produce destruction of the cellular osseous walls of the mastoid. The degree of the viscosity of the serous fluid is probably a factor in determining its escape

*Parenzyme: The National Drug Company, Philadelphia 44.

into the middle ear and then into and through the Eustachian tube. This is evidenced by the difference in the degree of ability to aspirate the fluid from the middle ear. On politzerizing many of the early cases, the fluid flows out with ease. Other cases require scrupulous aspiration because of the variable degree of the tenaciousness of the secretion.

The literature on this problem deals predominantly with the problem of chronic secretory otitis media. Many of the acute cases heal spontaneously, and a great many respond to simple management. In undertaking the evaluation of trypsin in the treatment of secretory otitis media, I felt it would be more appropriate not to wait until the cases became chronic before starting treatment with Parenzyme. There is no way to predict which cases are to become chronic. Many of the patients in this series had been treated by their family physicians for weeks before referral.

The use of Parenzyme is justified by the response in the patients treated, and by the fact that the number of myringotomies was reduced.

The question of controls may be raised, and rightfully. Since there is no method of predicting which case is to become chronic in nature, comparisons must be made with previous experiences over the two-year period preceding this study. During this period (before Parenzyme) most of the cases required 2 or more myringotomies and, on one occasion, at least 10 myringotomies were required.

The mechanism involved in trypsin therapy is not fully understood. There are several concepts which deserve some consideration. Martin[16] postulated: "The key then to the action of trypsin in an inflammatory reaction relates directly to the restoration of biological continuity, to the restoration of circulation and thereby the prevention of further cellular damage and death. The inflamed area does not become necrotic and no abscess formation occurs."

According to Miller,[17] the therapeutic effect of an antibacterial drug in inflammation depends on (1) the type and number of bacteria present; (2) the susceptibility of the micro-organisms; (3) the concentration at the affected site; (4) the chemical environment at the involved area, and (5) the degree of immunity of the host. The concentration of the drug at the affected site and the chemical environment in which it acts may be changed by the proteolytic enzymes. This investigator concludes, "The use of proteolytic enzymes enables partial modification of the physical and chemical environment to obtain better therapeutic results."

Martin et al.[18] presented evidence suggesting that "the antiinflammatory action of trypsin is a result of a direct facilitation of drainage from the inflamed area. The abilities of trypsin to increase permeability, cause vasodilation, and reduce viscosity of edema fluid, will all have the effect of facilitating drainage."

Although the mechanism of trypsin continues to be an academic problem, there is no doubt that clinical evidences have established a rationale for its use in the management of inflammation, edema, cellulitis, pain, and infection, regardless of etiology.

Summary and Conclusion

A method of treatment of secretory otitis media is presented whereby, in addition to the use of myringotomy and politzerization of the Eustachian tube, intramuscular trypsin is given twice a day in doses of 0.5 cc. (2.5 mg. trypsin) for five days.

Of 106 cases treated, 89 were cleared with one myringotomy and one course of Parenzyme treatment. The remaining 17 cases required two myringotomies to effect a cure.

This is in contrast to previous experiences, when two or more myringotomies were required to obtain comparable results.

All of the cases responded favorably and were completely free of fluid by the fifth day.

Parenzyme is a useful adjunct in the management of serous otitis media.

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The Antibody Level in the Tonsil Parenchyma and Its Correlations

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Introduction

The problem of the bacteriostatic properties of the tonsil parenchyma and of the presence in it of antibodies has been a subject of interest to a number of authors, (Berggren and Hellmann, 1931; Prásek and Zuk,[8] 1932; Schürmann,[11] 1954, Taillens,[13] 1950, Wright,[14] 1950). Until now, however, there has been no study to determine definitely the kind and quantity of such antibodies. Lately, in connection with researches on the behavior of antibodies in the course of tonsillitis chronica, we have identified one of them as a specific antistreptococcal antibody, i. e., antistreptolysin O (ASO) (Malecki and Grande,[5,6] 1955, 1956).

The object of the present paper is to discover an eventual correlation between the level of ASO in the tonsils and ASO in the blood serum, the weight of the tonsils, and the number of plasma cells contained in the parenchyma of the tonsils.

Material and Method

In all, 100 palatine tonsils have been examined; they were excised because of clinical symptoms of tonsillitis chronica in 50 patients, aged from 15 to 40 years.

The excised tonsils were carefully rinsed in isotonic sodium chloride solution; each tonsil was separately weighed on an analytical balance. The tonsils were then cut open, and specimens were made by bringing the slides into contact with the cut surfaces. The preparation was stained by the May-Grünwald-Giemsa method. At least 1000 cells were counted, and 2000 cells in those preparations in which plasma cells had a tendency to appear in conglomerations. Then each tonsil was ground separately in a mortar with a siliceous marl, and an equivalent in weight of isotonic sodium chloride solution was added. The ASO titer in the parenchyma obtained in this way was measured by the method indicated to us by the State Establishment of Hygiene in Warsaw (Dr. Wojciechowski and Dr. Pakula). The State Establishment of Hygiene also supplied us with streptolysin O, obtained from Todd-Hevitt's broth inoculated with a young culture of streptococci of the A group, strain D 58 (Richard type). The strength of the streptolysin O was measured by means of Todd's standard serum; it contained 20,000 units of antistreptolysin O in 1 ml. We accepted the titer up to 100 units as normal according to the technique applied by us and the average for our population. In the same way the ASO in blood serum obtained directly for tonsillectomy from patients with an empty stomach was also measured.

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Results

The ASO titer in the tonsil parenchyma amounted to between 0 and 800 units. This titer showed an increase in 14 tonsils, that is, in four patients on one side only, and in five patients on both sides. A complete absence of ASO in both tonsils was found in 11 patients, and in 4 on one side only. In eight cases the level of ASO was unequal in the left and right tonsils, the greatest difference being noted in Case 56, in which the right tonsil contained 20 units and the left one 800 units of ASO.

Comparatively, the level of ASO in the tissue corresponded to its titer in the serum of 16 cases; in 17 patients it was lower, and in 6 higher than in the blood serum. Of 15 patients with a raised ASO titer in the serum, 6 patients showed an increase in the tissue also, and of these in one case (No. 56) the amount of titer in the parenchyma exceeded by 500 units the ASO titer in the blood serum. Three patients showed an increased degree of ASO in the parenchyma only, having a normal level of ASO

in the serum. Of the above-mentioned nine patients with augmented ASO titer in the tissue, three showed a higher ASO titer in the serum than in the parenchyma, the remaining six patients showing a higher ASO in the parenchyma.

The weight of individual tonsils varied between 1.3 and 9.6 gm., an average of 4.21 gm. A difference in weight between the right and left tonsil exceeding 0.5 gm. was noted in 14 patients. Concerning the correlation between the weight of the tonsils and their ASO content, this exists in the sense that increased titers, such as 200, 250, or 800 units, occurred only in tonsils weighing over 3.0 gm. In no tonsil weighing less than 2.0 gm. did the ASO content exceed 100 units.

The proportion of plasma cells in our tonsillograms in relation to all the others, i. e., to lymphoblasts, prolymphocytes, large, middle-sized, and small lymphocytes, cells of the reticulum, and granulocytes, was between 0.25% and 6%. Conglomerations of plasma cells from 6 to 12 were found in some specimens. In 80% of the slides one and more granulocytes in the vicinity of the plasma cells were met with. In four cases cocci were noted in the granulocytes, while similar micro-organisms were noted in the network cells in two cases, and bacteria in one case. The proportion of plasma cells in 19 patients exceeded 0.8%. In general the number of plasmocytes was not parallel to the level of ASO in the parenchyma of the tonsils. If, however, the above values were compared in the same individual, the percentage of plasmocytes was higher on the side with a greater ASO content in the parenchyma than in the other tonsil. When comparing the percentage of plasmocyte content in the parenchyma to the amount of ASO in the serum, we noted the similarity of the data in two-thirds of the cases.

In comparing the plasmocyte contents to the size of the tonsils, we noted no correlation between them. It is a significant fact, however, that even very small tonsils sometimes showed a distinctly increased number of plasmocytes, as, for instance, in Case 36, where a tonsil weighing 1.3 gm. contained 3.5% of plasmocytes in agglomerations of up to 12 cells closely massed together.

Comment

When measuring the level of antistreptolysin 0 in the tonsil tissue, we realized fully that we were studying only one of several possible antibodies. However, the actual fact of having discovered this antibody in the parenchyma and the possibility of determining the level of its titer can have a significance in the lasting controversy concerning the function of the tonsils. Concerning the quantity of this titer in our material, it is only in a certain percentage of cases that this confirms Taillen's [13] opinion (1950) that the titer of antibodies in lymphoid organs is always higher than in the circulating blood. The lack of a close balance between the ASO titer in the parenchyma and its level in the blood serum is considered by us as one of the proofs of the formation of antibodies in the tonsil itself, particularly in relation to those cases where the ASO titer in the parenchyma is higher than in the blood serum. It is improbable that antibodies formed in other areas should be absorbed to such a high degree by the tonsils, although the ability of tonsils to colloidopexy can be considered as proved (Taillens [13]). Those cases which show differences in the ASO titer between the right and the left tonsil also support the view that the formation of antibodies is in the parenchyma itself, for it is hard to imagine such an asymmetry in the level of antibodies if they are supplied to the tonsils only by way of blood circulation.

The phenomenon of asymmetry itself in the ASO level was for us at first a surprising fact. Our efforts to find a reason for it in the difference of weight and morphological changes did not prove convincing. We are inclined, therefore, to attribute the responsibility for this state to the antigenic properties of micro-organisms, on condition, however, that the time factor is taken into

consideration, since by obtaining the material for examination at a given moment, i. e., performing a tonsillectomy, we cannot avoid certain incidental occurrences conditioned by the lapse of time since the last latent invasion of micro-organisms. Also to be taken into consideration are the fluctuations in the amount of titer, depending on the length of time needed for the formation of a given quantity of antibodies as also on the average period of their storage, which does not exceed 75 days according to Ehrich [2,3] (1946, 1949).

In one of the preceding reports (Malecki and Grande,[5] 1956) we ascertained that the level of the ASO titer in the serum—in so far as it was already in excess—diminished in about two-thirds of the cases in the first weeks after tonsillectomy. We obtained far more favorable postoperative results with these patients than with those whose ASO titer in the serum remained undiminished. On the one hand, these observations confirm the interdependence between the height of the ASO titer in the serum and the close contact of the bacterial antigens with the parenchyma. On the other hand, however, they also corroborate the possibility of the formation of antibodies in the parenchyma.

Most authors accept a certain parallelism between the formation of antibodies in lymph nodes and the growth of the number of plasmocytes. Among others, Moeschlin et al.[7] (1951) confirmed the increase of the number of plasmocytes and also the appearance of antibodies in the blood of rabbits after they had been immunized. In our clinical material the relation between the number of plasmocytes in the parenchyma and the level of the ASO titer in the serum shows a far-reaching conformity with the results obtained by those authors (Ehrich et al.,[2] 1949) who studied in animals the relation between the plasmocytes in the lymph nodes and the number of antibodies in the blood. However, when investigating the relation between the number of plasmocytes and the ASO level in the parenchyma, we find a relatively great difference between individuals in conjunction with a relative balance only when comparing the right and left tonsil of the same individual. This can be ascribed to the differences in the capacity of activization of all those factors—partly local—which compose an individual capacity of reaction. It seems highly probable, that the parallelism of results would be more apparent if our researches also included other antibodies. A lack of parallelism between the formation of antibodies and the growth of reticuloendothelial and plasma cells was also felt in the experiments of Ehrich and Harris [3] (1942) and Harris and Harris [15] (1949), who studied those elements in the lymph nodes of rabbits after giving them an antigen.

If the activity of plasma cells as producers of antibodies is closely connected with the phenomenon of resistance (Bjørnboe et al.,[1] 1947; Ehrich and Harris,[3] 1942, 1946; Gutt, 1956; Sałtykow,[9] 1932; Schenck,[10] 1955), their activity depends to a high degree on the close contact of the micro-organisms with the tissue. As was shown by our histobacteriological researches,[6] the invasion of micro-organisms deep into the parenchyma occurs much more frequently than is generally supposed; in preparations made of tonsil tags we have found bacteria and fungi of the type Nocardia streptomyces in the depth of the tissues and distinct granulocytic reaction—this at a time when, clinically, nothing indicated any aggravation of the inflammatory process. These researches, as well as the evidence of the cytograms described above, pointed to the possibility of frequent and direct contacts between micro-organisms and elements of the lymphoid tissue, as a result of which conditions are created for transforming the bodies of micro-organisms into chemically active antigens and for the taking over by the plasma cells as producers of antibodies. As we found micro-organisms in the tissue only in agglomerations and in defined places, it seems likely that this fact is connected with the placing of the plasma cells, which are also usually met in agglomerations.

The conclusion drawn from the above considerations is that tonsils possess remarkable possibilities of mobilizing cellular elements and humoral factors which can play a decisive role in the offensive-defensive processes taking place in their parenchyma. As a result of this the organism is usually victorious and only a serious overthrow of equilibrium can bring clinically noticeable reactions. However, only further investigations will be able to elucidate the conditions under which tonsils react to the invasion of micro-organisms, whether by a limited production of antibodies and by probable stimulation of the reticuloendothelial system, as was suggested by Skoog [12] (1935), or by hyperergic reactions as a shock area. If the hyperergic reactions, which can be explained by the excess of antibodies, produce undesirable symptoms, a still greater danger may result for the organism from the functional breaking down of the tonsil parenchyma.

Summary

The titer of antistreptolysin O in the parenchyma of 50 patients has been measured after tonsillectomy. The results have been compared with the titer of antistreptolysin O in the serum, also with the weight of the tonsils and the number of plasma cells of the same patients. In the parenchyma titers were found up to 800 units, the level of antibodies not always being the same in the right and left tonsil. The titer of antistreptolysin O in the parenchyma corresponded to the level of this antibody in the serum in 16 cases. During the period of involution, the tonsils are not able to produce greater quantities of antibodies; however, even very small tonsils can contain greatly increased quantities of plasma cells. The number of plasmocytes in the tissue of individual patients showed great differences. A parallelism between the plasmocyte content and the level of antistreptolysin has been established only when the figures obtained from the right and the left tonsil of the same patient have been compared. The results obtained indicate the capability of the parenchyma to produce antibodies with the active participation of local plasma cells.

J. Grande, M.D., Chief of the Laboratory of the Central Clinical Hospital in Lodz, cooperated in serologic questions.

Mazowiecka 1.

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The Surgical Treatment of Recurrent Nasal Polypi

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The main problem in the treatment of nasal polyposis is that of recurrence. Despite the universal recognition of the importance of allergy in the causation of nasal polypi, allergic investigation and antiallergic treatment have not proved entirely successful in preventing recurrences after intranasal polypectomy. It is too early to form a final opinion on the value of cortisone therapy in effecting a permanent cure, but desensitization and the use of antihistamine drugs have proved disappointing.

In my experience, recurrences are frequent when intranasal ethmoidectomy is performed, and the transantral operation has not given a higher percentage of permanent cures. This may be attributed to an inability to perform a thorough exenteration of the ethmoidal labyrinth by use of these techniques.

When recurrences are frequent in spite of local removal and treatment directed to the fundamental causes, it is my present practice to perform an external ethmoidectomy. This is the surgical measure which is most likely to give lasting relief. Other British surgeons have recently expressed a similar view. Hargrove and Harrison have recorded their experience in the treatment of recurrent polypi using the Norman Patterson type of external approach to the ethmoid. It is the purpose of this paper to report a series of patients operated upon by a modification of the classical external method first suggested in 1902 by Guisez, who performed the operation by using an incision around the inner canthus of the eye without disturbing the frontal sinuses.

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TABLE 1.—*Recurrent Polypi—External Ethmoidectomy*

Total No. Patients	42	Male 25 (59.5%) Female 17 (40.5%)	
Total Operations	70	Unilateral	14
		Bilateral	28
Age Incidence	Oldest 65 yr. Youngest 15 yr.		

Age, Yr.	No. Patients
15–20	5
21–30	5
31–40	8
41–50	15
51–60	7
61–65	2
Total	42

Material

In this series a total of 70 operations have been performed on 42 patients, as detailed in Table 1, the oldest being 65 and the youngest 15 years of age (Fig. 1). All had had numerous polypectomies done previously, one patient having had polypi removed on 30 occasions in 20 years. Many had had previous nasal operations for the treatment of infection, such as antral wash-out or intranasal or radical antrostomy. Others had been treated by intranasal ethmoidectomy or transantral ethmoidectomy; a few had had a submucous resection of the septum performed.

A full investigation was carried out on every patient, including allergic skin tests. Appropriate antiallergic therapy, and, when it was indicated, medical and surgical treatment of infection were

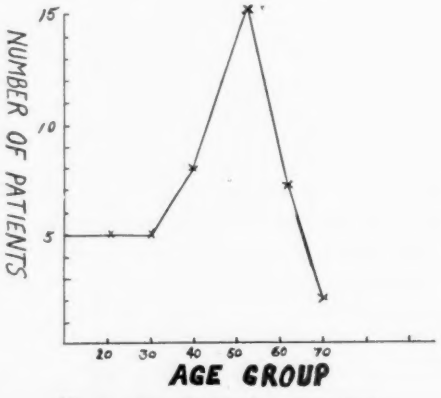

Fig. 1.—Age distribution of patients.

TABLE 2.—*Etiology*

	No. Patients	Operations
Pure allergy	17	28
Pure infection	8	12
Combined: allergy + infection	4	6
Uncertain: probable allergy	13	24
Total	42	70

instituted routinely before submitting patients to operation. Cortisone, however, has not been used in this series.

Etiology

The factors thought to be responsible for the tendency to polyposis are analyzed in Table 2. In nearly one-third of the operations no definite cause could be found. There was neither clinical, radiological, nor pathological evidence of infection, and no allergic history; skin tests were negative, and there was no demonstrable allergy. It is probably correct to classify this group with the allergic variety in the light of our present knowledge, as the polypi were similar in appearance to those found in the typical allergic patient.

Pure infection was the etiological factor in only 17.1% of the operations, but in 27.3% of the patients. This discrepancy is explained by the fact that infective cases were usually unilateral while the allergic ones were bilateral. If the "uncertain" and the "combined" cases are regarded as primarily allergic, over four-fifths had an underlying allergic diathesis.

Asthma is sometimes associated with nasal polyposis. Of the 42 patients, 8 (19%) were asthmatics, and 14 out of the 70 operations (20%) were performed on asthmatics. In 4 of these 14 (28.6%) there was associated infection. These figures are in agreement with Hogg's experience, who found that 11 out of 46 (23.9%) asthmatic patients in Britain developed polypi. This is much lower than the incidence of asthma in South African patients with polypi—60%—suggested by Bekker. Allergic subjects may thus have a varying incidence of allergic manifestations according to the geographical zone in which they live.

Operative Technique

Operation should aim at producing the minimum disturbance of normal structures compatible with adequate exposure, good access, clear vision of the operative field, and complete exenteration of the diseased ethmoidal labyrinth. This can be achieved only by an external operation. The type of external operation performed is a personal matter. My own preference is for the classical approach through the medial wall of the orbit. This is easier and safer than the Patterson operation and gives equally satisfactory cosmetic end-results.

In bilateral cases it is my present practice to operate on both sides at the same sitting, although when this work was first begun in 1948 operation on the less affected side was deferred to a later date. With increased experience and confidence in the operation coupled with modern anesthetic techniques, this delay is no longer necessary.

Anesthesia.—General anesthesia has been employed in all cases. After induction and intubation, hypotension is induced by the intravenous injection of a ganglion-blocking agent. Posturing the patient into a head-high, feet-low position aids the fall of blood pressure to the desirable level of 65 mm. Hg. As I have pointed out elsewhere, the bloodless field which results insures complete exenteration of the cells with anatomical exactitude in the depths of the deep cavity.

Lighting and Magnification.—The use of a careful, meticulous technique with better illumination than was customary in the past, aided by magnification with the operating loupe or microscope, is a technical advance which has been adopted from otological surgery. The Cameron surgical headlamp and a loupe (× 2½ magnification) are used for the routine, precision work of the operation. They are more convenient than a microscope, as it is possible to work around corners and at varying depths without further adjustment. Automatic movements of the head keep the operative area in focus. The microscope may be used at the end of the operation for tidying up the cavity. Tags

of mucosa which have been overlooked, especially those on the cribriform plate, are then safely removed with × 10 magnification.

Incision.—Careful attention to the site of the incision will influence the cosmetic result. Before it is made, the skin on the side of the nose is stretched with the fingers of the left hand. The incision is placed nearer the midline than is usual: over the nasal bone, not over the frontal process of the maxilla. An imaginary line, drawn from the inner canthus of the eye to the midline of the dorsum of the nose, is divided into thirds. A ½ in. long incision is centered at the junction of the medial third with the lateral two-thirds (Fig. 2). The scalpel blade is held at right angles to the skin and is carried straight down to the periosteum at the same level. The incision is not extended upwards to curve outwards beneath the eyebrow, as in the classical approach. This low incision will avoid all deformity. The subsequent contracture of fibrous tissue which bridged the curve of the classical incision often caused a raised unsightly scar. The incision can be extended downwards and slightly outwards,

Fig. 2.—Incision ½ in. long, centered at the junction of a medial third and lateral two-thirds of the line drawn from the midline of the nose to the inner canthus.

Fig. 3.—Skull, showing orbit. The incision used by me lies over the nasal bone (*A*) but the longer classical incision is placed over the ascending process of the maxilla (*B*). The smooth curve leading into the orbit above the lacrimal fossa is marked at *C*. Note position of the posterior lacrimal crest lateral to the anterior crest. (Reproduced with permission from Korkis, F. B.: Recent Advances in Otolaryngology, Ed. 3, J. & A. Churchill, Ltd., London.)

if more room is needed. Reference to a skull will show that the upper limit of the classical incision will cross the frontonasal articulation on to the frontal bone, whilst the incision which has been described will never do so (Fig. 3).

Approach.—A small sharp dissector elevates the periosteum over the nasal bone and frontal process of the maxilla until the medial palpebral ligament is seen at its attachment to the anterior lacrimal crest. It is a clearly defined, very firm band, easily recognizable as its fibers cross the middle of the wound transversely. The point of attachment to the bone is clearly cut through with a scalpel (Fig. 4). The tough fibers are unduly traumatized if they are scratched away with a periosteal elevator. The lacrimal sac and groove are now exposed.

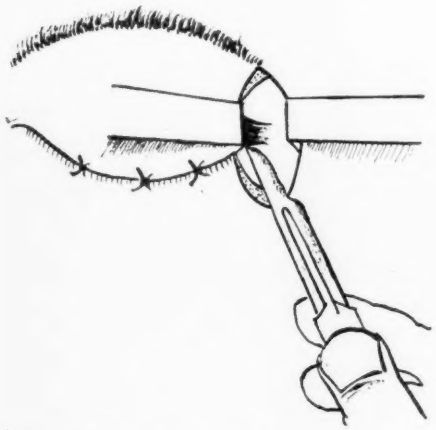

Fig. 4.—Division of medial palpebral ligament by scalpel close to its medial attachment to the bone.

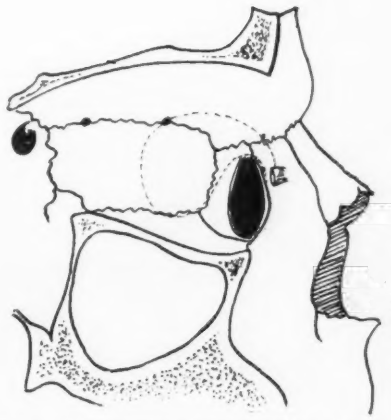

Fig. 5.—Diagrammatic representation of area of bone usually removed as indicated by the dotted line. Note that the posterior half of the orbital plate of the ethmoid is not removed.

The dissection is carried backwards and laterally, as far as the posterior lacrimal crest but no further, and the lacrimal sac is retracted outwards. The posterior lacrimal crest is not only a ¼ in. behind, but is also ¼ in. lateral to the anterior crest. It is easy to perforate the orbital periosteum in elevating it from the posterior crest in the region of the lacrimal fossa. The trick here is to approach the medial wall of the orbit from above (Fig. 3). A blunt dissector passed upwards and outwards above the lacrimal groove follows a natural smooth curve in the bone, and carries the tip on to the outer surface of the lacrimal bone in the orbit; the sharp angle made by the projecting posterior crest is thereby avoided. It is now both easy and quick to elevate the periorbita from the orbital plate of the ethmoid to a point just posterior to the foramen for the anterior ethmoidal vessels. It is unnecessary to carry the dissection further backwards.

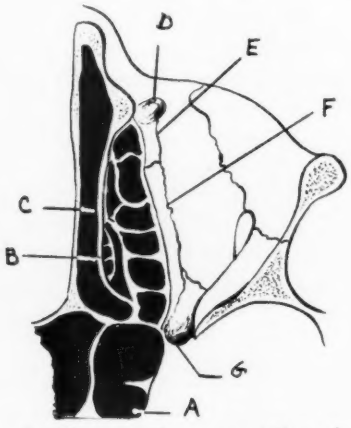

Fig. 6.—Diagrammatic representation of orbit and ethmoid in horizontal section to show relationship of the operative field. *A*, sphenoid sinus. *B*, turbinate. *C*, nasal cavity. *D*, lacrimal canal. *E*, lacrimal bone. *F*, orbital plate of ethmoid. *G*, ethmoidal cells.

The ethmoid is entered by removal of the lacrimal bone and anterior part of the orbital plate of the ethmoid (Fig. 5). The posterior half of the orbital plate is preserved carefully (Figs. 6 and 7). If this is done, there can be no danger to the optic nerve (Fig. 8) in the region of the optic foramen. All that is required is a large enough window through which one can see and work.

Exenteration of Ethmoid.—The whole of the lateral mass of the ethmoid, with the exception of the posterior orbital plate and roof, can now be removed under direct vision. A mass of polypoidal degenerate mucosa is encountered. Few cell walls remain. By working through the orbital window, as well as through the anterior nares, every vestige of diseased mucosa is removed.

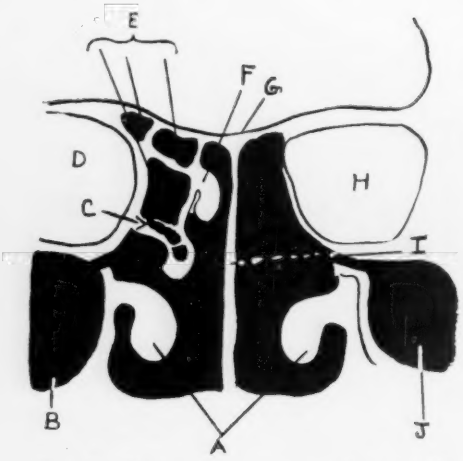

Fig. 7.—Diagrammatic representation showing the relations in coronal section. On the left before operation; on the right after the operation, showing portions removed. *A*, inferior turbinates. *B*, antrum. *C*, middle turbinate. *D*, orbit, left. *E*, ethmoidal cells. *F*, superior turbinate. *G*, cribriform plate. *H*, orbit, right. *I*, septum. *J*, antrum, right.

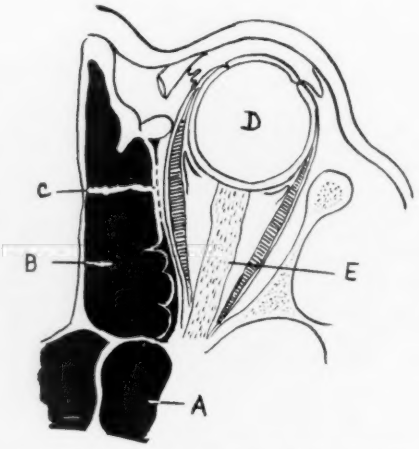

Fig. 8.—Horizontal section to show portions of nose removed in relation to orbit. The portion of lacrimal bone and orbital plate of ethmoid removed is indicated by the dotted line. *A*, sphenoid. *B*, nasal cavity. *C*, wall removed for access. *D*, eye. *E*, optic nerve.

Each group of ethmoidal cells is systematically sought after and exenterated. This involves the removal of the middle and superior turbinates. It is possible to clean the medial surface of the posterior portion of the bony orbital plate which has been preserved by working carefully along it, from before back and from the medial side outwards. The window is used for visualization, the nostril for instrumentation. A small postnasal mirror passed through the fenestra aids retrograde vision as the agger nasi group are removed via the nostril. The sphenoid mucosa is cleared when it is involved. The cribriform plate is carefully cleaned. In this area cell walls usually remain, and incomplete removal of diseased mucosa is likely. The remaining bony septa are lowered until the surface is smooth. Here, magnification is of the greatest assistance. The septal mucosa is treated with the greatest respect to avoid postoperative adhesions.

In cases associated with chronic infection of the frontal sinuses, the operation is extended upwards and forwards. The frontonasal ostium is greatly enlarged and the mucosa of the frontonasal duct removed, but that lining the interior of the frontal sinuses proper is not disturbed. In such instances a large plastic drainage tube is inserted into the newly enlarged frontonasal duct.

Closure.—With the above exception, the wound is closed completely without drainage. The lachrimal sac is allowed to fall back in place, and the skin is closed with fine plastic sutures on an eyeless needle. The two ends of the incision are picked up by two skin hooks which are held by an assistant, the same constant degree of traction being maintained until closure is complete, another assistant cutting the sutures. This technique assures accurate apposition of the divided skin edges, which are reunited by sutures placed at close intervals. A postage stamp of tulle gras covers the wound, and a Moorfield's eye bandage completes the dressing.

Results

Operative Complications.—It is convenient to divide the results into two groups, the immediate and the remote. There have been no operative deaths, and all the immediate complications listed in Table 3 responded readily to treatment.

TABLE 3.—*Immediate Results of Operations*

	No.
Primary healing of wound	70
Temporary C.S.F. leak without infection	2
Temporary C.S.F. leak with meningitis—recovery	1
Temporary diplopia	1
Slight temporary epiphora	2
Persistent epiphora requiring treatment	1
Minor intranasal adhesions	3

In spite of the utmost care, the dura was damaged in three cases. The cerebrospinal leak was very small in all three. These were early cases, and the use of a microscope for clearing the cribriform plate is of help in avoiding such mishaps. The site of injury in all three cases was recognized at operation. The defect was minute.

The only patient who developed meningitis (pneumococcal) was the only one to have a muscle graft applied to the tiny defect. A free muscle graft without a blood supply is an ideal culture medium for bacteria. It is better, therefore, to leave such small defects well alone and rely on prophylactic chemotherapy and antibiotics. The leaks ceased spontaneously in 24-48 hours in these patients.

TABLE 4.—*Period of Follow-Up*

Time, Yr.	Patients	Operations
1	6	8
1-2	15	28
2-3	8	10
3-4	5	8
4-5	5	9
6-7	2	3
7-8	2	2
8-9	1	2
Total	44 *	70

* Difference of 2 due to operations performed on the same patient at different times on each side.

Late Results.—The immediate outcome being favorable, the operation must stand or fall on the long-term results. A prolonged period of observation, with regular follow-up examinations, is necessary before an accurate assessment is possible. There is no arbitrary time limit for the publication of long-term results in nonmalignant nasal conditions, but this is highly desirable. A true assessment is possible only by studying the results in relation to time. The present findings suggest that at least three years should elapse before final assessment, but this may well be too short a period.

TABLE 5.—*Recurrence in Relation to Time of Occurrence Postoperatively*

Time of Appearance Postoperatively, Yr.	No. Recurrences	No. Operations	Total
1	1	8	1/8
1-2	1	28	2/36
2-3	1	10	3/46
3-9	0	70	3/70

The follow-up period in relation to these cases is shown in Table 4, the minimum period of postoperative observation being one year. There have been three minor, localized recurrences in 70 operations. Table 5 shows the time at which the recurrence was first noted in relation to the number of operations performed in that period. Table 6 summarizes all late complications and the late results.

TABLE 6.—*Late Complications and Results*

A. Cosmetic:	Scars invisible	39
	Scars just visible	31
B. Nasal:	Recurrence	3
	Mucoid or mucopurulent discharge	24
	Crusting (minor)	3
	Return of smell	7
	Permanent anosmia	1
	Acute frontal sinusitis (2 years postop.)	1
	Empyema frontal sinus (8/12 postop.)	1
C. Lachrimal:	Acute dacryocystitis (2 yr. postop.)	1

All the three recurrences were small, and all occurred in markedly allergic subjects. In one case, a very small polypoidal tag first made its appearance in the third postoperative year and has been observed to the fifth postoperative year. Owing to its situation it has not been removed, but regular follow-up has not shown any increase in its size, and the patient is symptom-free and unaware of its presence. Recurrence took place in the agger nasi region in the other two instances. Local removal was carried out with ease under local anesthesia in these patients. Thus, the recurrence rate in the whole series is only 4.3%, but it must be remembered that further recurrences may still occur as all the patients have not yet reached the three-year period of observation. There has been no recurrence after three years in this series.

Apart from external ethmoidectomy, there is no other operation which can show such a low recurrence rate in my experience. Every patient is satisfied with the result. No

patient has had any postoperative nasal obstruction, although previously many had only short periods of free nasal respiration between repeated polypectomies.

Many fear to carry out radical surgery because they fear postoperative crusting. This complication has been overstressed in the textbooks. Mild crusting was noted in three operations only. It was not troublesome, and alkaline nasal douching sufficed to control it. When all nonpolypoidal mucosa, especially that covering the inferior turbinate and the septum, is respected, crusting has not been found to be a problem.

The main complaint has been of a persistence of nasal and postnasal discharge. This, however, was present preoperatively in greater degree. Persistent rhinorrhea was noted mainly in allergic patients with asthma and allergic rhinitis, and in those with associated pansinusitis. Persistence of low-grade frontal or maxillary sinus infection, or reinfection of these sinuses at a later date, is the usual cause for mucopurulent nasal discharge. Two patients developed frontal sinusitis, the first eight months postoperatively; the empyema in this instance was a direct result of stenosis of the enlarged frontonasal duct, for this patient had an associated suppurative frontal sinus infection at the time of ethmoidectomy. In the second patient catarrhal frontal sinusitis developed two years postoperatively after a cold, and is probably not related to the ethmoid operation in any way.

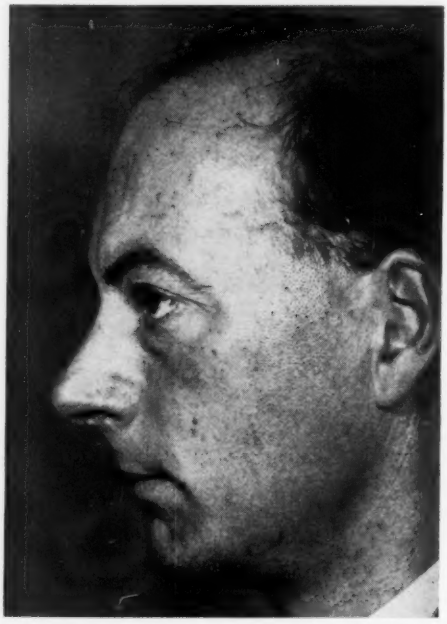

Fig. 10.—Same patient photographed Nov. 9, 1955 (one year after operation). Note that the scar is now invisible. Patient has no further trouble and is very satisfied.

Fig. 9.—External frontosphenoethmoidectomy on man aged 41 years on Nov. 24, 1954. Postoperative photograph, Dec. 9, 1954 (15 days after operation). Note obvious scar. This is longer in a downward direction than the typical incision described, owing to wide removal of bone to enlarge the frontonasal duct on account of chronic frontal sinusitis.

The sense of smell returned in seven patients who were previously completely anosmic at the following times after operation: 1st postoperative month, two patients; 2d month, 1 patient; 3d month, 1 patient; 8th month, 1 patient; 9th month, 1 patient; 12th month, 1 patient. One patient lost the sense of smell permanently after the operation, although it used to return between polypectomies previously. The other patients did not notice any change in olfactory function after operation. The patient who de-

veloped acute dacryocystitis did not have any lacrimal symptoms for two years after ethmoidectomy. It is probable that this infection is not associated with the operation, but it is recorded for the sake of completeness of records.

The cosmetic end-results of all operations have been excellent. All patients were delighted with the scars at the end of the first year. They were then invisible at close range in 39 operations, and in the remaining 31 were so good that careful inspection was required to detect them.

The relative freedom from recurrence and from serious postoperative complications, the good cosmetic results, and the high degree of satisfaction expressed by all the patients justify the operation.

Conclusion

As radical ethmoidectomy has given such good results, it is the surgical treatment of choice for patients with recurrent nasal polyposis. There is every likelihood that the polypi will not recur, at least for a long period of time, when a meticulous technique is used. If all ethmoidal cells are exenterated, a long period of freedom is assured for most patients, although one cannot be sure that a small polypoidal tag will not develop at some future date. These, however, are small and localized, and, if a regular postoperative follow-up is carried out, need never cause the patient obstructive symptoms, as they appear to be very slow-growing.

As a group those who have undergone this operation are the most satisfied of all patients. They are saved from the psychological trauma associated with repeated visits for polypectomy and from the disappointment, inconvenience, and distress occasioned by the inevitable return of their symptoms when less radical methods are adopted.

33 Harley St. (W. 1).

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Past and Present Treatment of Labyrinthitis Otogenes

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Those who attended congresses on labyrinthitis and otitis media about 1927 and those who currently studied the publications issued about that time will remember that at that period this subject presented very great difficulty, aroused the most vivid interest, and frequently provoked animated discussion. It demanded a broad basis of theoretical knowledge, together with a profound knowledge of laboratory and clinical practice. A thorough mastery of the whole problem was at that time in the nature of a test of otological education.

It is not possible in a short paper to mention even briefly the merits of those who gave the creative impulse to this subject. The mere enumeration of the standard names connected with labyrinthitis recalls and revivifies the problems connected with them: Alexander, Bárány, Blau, Barnick, Bondy, Bories, Beck, Briger, Brock, Brunner, Dohlman, Friedrich, Gerber, Gradenigo, Goerke, Gomperz, Grünberg, Güttick, Hinsberg, Holmgren, Hayman, Hegener, Habermann, Heine, Jansen, Karbowski, Kopetzky, Kobrak, Kümmel, Kleist, Kramm, Knick, Körner, Lange, Leidler, Linck, Lucae, Lund, Manasse, Mayer, Mygind, Nager, Neumann, Nylen, Passow, Politzer, Panse, Portman, Quix, Ramadier, Runge, Ruttin, Scheibe, Schmigelów, Schoetz, Siebenmen, Steurer, Szasz, Schlander, Uffenorde, Voss, Wegener, Weber-Liel, Wittmaack, Yoshii, Zange, Zeroni, and others.

The period of sulfonamides and antibiotics has to a great extent altered the aspect of these problems. Scrupulous diagnosis and detailed analyses of the greatest possible group of factors in order to decide upon the appropriate method of treatment have to a certain degree ceased to be of such urgent importance.

The otologist, armed with antibiotics, surgical magnifying glasses, and many other technical devices, tackles the problem of labyrinthitis less frequently but much more boldly, efficiently, perhaps more superficially and with less solicitude than in the days when the life of the patient depended to a far greater extent on his knowledge, careful observation by day and night, and technical efficiency. Depending on the social conditions in various parts of the world, labyrinthitis is not of uniform importance. Although the problem has been much simplified and circumscribed, it is still not only of historical but also of topical interest.

For a comparison of past and present in the treatment of labyrinthitis, I have used my own material, observed in the Krakow Clinic during the last 30 years. I shall discuss briefly the material of the years 1928-1937 (Period I), consisting of 212 cases, and that of 1945-1954 (Period II), consisting of 250 cases, which I have elaborated with Sekula. The number of inpatients from whom the labyrinth cases were selected was about twice as great in Period II as in Period I. The years 1938-1944 have not been taken into account in order to obtain a sharper contrast between the period preceding and that following the general introduction of chemotherapy and antibiotics. The sharpness of the distinction would be blurred, because the last years of Period I were under the influence of sulfonamides, while the first years of Period II, in our conditions, were poor in antibiotics both in quantity and in variety. It was only in 1949, as is apparent from Sekula's graphs,

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TABLE 1.—*Classification of Cases of Labyrinthitis*

Forms of Labyrinthitis	No. of Cases	
	Period I	Period II
O.i. circumscripta	83	110
O.i. diffusa manifesta	36	26
O.i. duffusa latens	33	37
O.i. complicata	60	77
Total	212	250

that antibiotics began to be widely used. In the comparison of the two groups, I shall use the simplest possible division of the whole material, i. e., into the most fundamental groups. We shall speak of the forms of labyrinthitis (denoted by o. i. = otitis interna) shown in Table 1.

Cases of o. i. serosa are partially included in the o. i. circumscripta group and partially in the o. i. diffusa manifesta group. In the o. i. diffusa latens group no distinction is made between compensata and noncompensata. Labyrinthitis traumatica and tuberculosa are not discussed.

Otitis Interna Circumscripta

Depending on the material and accepted definition, the frequency of diagnosis of otitis interna circumscripta (o. i. c.) varies. Turner and Fraser ascertained 25% of o. i. c. in their labyrinth material. Boserup had 38%, Stewart and Fraser 58%, while Roekemer in his material of otitis interna noncomplicata ascertained o. i. c. in 80% of cases. In the material of the Krakow Clinic, o. i. c. was diagnosed in 83 cases out of 212 labyrinth cases treated in the Clinic in Period I, i. e., 39%, while in Period II there was 44%.

Diagnosis was based on case histories, the fistula sign, functional examination of the ear, and the surgical picture. In this way, o. i. c. without the fistula sign is included in this group. As may be seen from Graph 1, the total number of o. i. cases decreases, while the number of o. i. c. cases is relatively increased.

Hence operation on the labyrinth was only exceptionally applied in this group (paralysis of the seventh nerve, with marked destruction of the labryrinth block, insignificant remains of function). In Period II, the number of radical operations increased, while purely conservative treatment decreased.

Antibiotic protection and operative technique (magnifying glasses, electrical drill, irrigation, local anesthesia) have created much safer conditions for setting the middle ear spaces in order. The same factors rendered it possible in Period II to perform the radical conservative operation. Finally,

Graph 1.—The number of cases of otitis interna diffusa from 1945 to 1954 is indicated by the solid line; the number of cases of otitis interna circumscripta by the broken line. The relation of the curves indicates that antibiotics have practically no effect on otitis interna circumscripta. This links up with the most frequent mechanism of otitis interna circumscripta, i. e., cholesteatoma, which cannot be prevented by the use of antibiotics. (Data given by Sekula.)

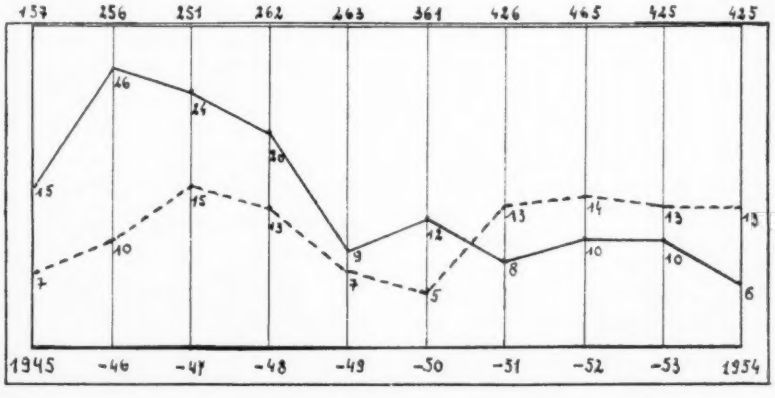


TABLE 2.—*Treatment of Otitis Interna Circumscripta*

Treatment	Period I	Period II
Labyrinth operation	1%	2%
Radical operation	61%	79%
Radical conservative operation	0%	9%
Strictly conservative treatment	38%	10%
No. of patients	83(100%)	110(100%)

the behavior of the hearing in Period I was such that after the radical operation during a fairly long observation (at least two years) the hearing power usually decreased or disappeared, while in Period II in about a quarter it attained a somewhat higher level than previous to operation.

The mortality in Period I was 0%. In Period II there was one fatal case (septicopyemia).

The diagnosis of o. i. serosa varies according to the clinical point of view. Beck requires that during the whole period of subjective and objective signs of o. i., as well as later, vestiges of the functions of the inner ear should always be elicited. Alexander accepts in his definition the transient complete loss of the functional power of the inner ear. Ruttin has almost the same attitude as Beck, but admits the occasional possibility of the transient disappearance of the functional power of the inner ear. Almost all those who use the clinical designation of otitis interna serosa share the view that this is a benign form or stage of the disease. Ruttin emphasizes that in his form of o. i. diffusa serosa secundaria the transition into o. i. purulenta is very easy under certain circumstances. Some kinds of cases of o. i. discussed by Lund, which causes intracranial complication prior to the total extinction of the function of the inner ear, should be mentioned here.

The clinical diagnosis of o. i. serosa during otitis media acuta and o. scarlatinosa has many uncertain aspects. O. i. inductiva Wittmaack, i. e., labyrinthine signs which appear from about 24 hours to a few days after the radical operation, is fairly generally regarded as a benign form. How very fragile these criteria for the diagnosis of o. i. serosa were and are is shown by G. Holmgren's proposition that in certain cases during operation on the middle ear the ligamentum annulare stapedis should be punctured in order to obtain the aspirate for laboratory investigation. Turner, out of 124 cases of o. i., diagnosed o. i. serosa in only 3. Lund, out of 338 cases of o. i., diagnosed o. i. serosa in 100. Zange, emphasizing the uncertainty of the diagnosis of o. i. serosa, asserts that departments which have a fairly large material at their disposal are more radical as regards o. i. serosa than those with a smaller number of patients. It is evident that in a larger material the high percentage of unfavorable cases is caused by too conservative an attitude with regard to o. i. serosa. If mention is made here of various views on the diagnosis and treatment of o. i. serosa and the difficulties involved, it is only to avoid uncertain figures and to emphasize that the whole problem has been greatly simplified by the introduction of antibiotics, and that a treatment strictly conservative or in combination with procedures decompressing the middle ear spaces almost always gives successful results.

Otitis Interna Diffusa

By the clinical term o. i. diffusa we understand o. i. with complete and permanent loss of all function of the inner ear. We shall divide this form into two groups, i. e., o. i. noncomplicata and o. i. complicata. O. i. diffusa noncomplicata is in turn divided into manifesta and latens. O. i. diffusa is represented in our material by 129 cases in Period I and 140 in Period II.

Otitis Interna Diffusa Manifesta.—This group of cases may be divided into two

TABLE 3.—*Classification of Cases of Otitis Interna Diffusa*

Form of O.I. Diffusa	Period I		Period II	
	No. Cases	%	No. Cases	%
Manifesta	36	27.5	26	18.5
Latens	33	27	37	26.5
Complicata	60	45.5	77	55
Total	129	100	140	100

TABLE 4.—*Classification of Cases of Otitis Interna Diffusa Manifesta*

O.I. Form of O.I.D.M.	Period I		Period II	
	No. Cases	%	No. Cases	%
In otitis media acuta	14	39	4 *	15
In otitis media chronica	22	61	22	85
Total	36	100	26	100

* The figure of 39% of labyrinth complications in Period I, as compared with that of 15% in Period II, shows the beneficial influence of antibiotics in the course of otitis media acuta. A contrary behavior is seen in otitis media chronica (masking).

subgroups, one in the course of otitis media acuta, and the other in the course of otitis media chronica.

Treatment of O. I. Diffusa Manifesta.—With reference to this form, it should be noted that although the material from which this type of case was selected was twice as large in Period II, yet this group is smaller (26 cases) as compared with Period I (36 cases). Many of these cases demonstrate the unsuitability of the uncritical application by nonspecialists of antibiotics in the course of otitis media chronica, especially in cases of o. i. circumscripta. Again, we see that in Period I, 44% of cases were treated conservatively, and in Period II, only 3.5%. If we characterize o. i. manifesta, we may say that the influence of antibiotics caused a significant reduction in the number of cases, which became about 2.5 times smaller, but that many cases were treated uncritically with antibiotics, bringing about a situation later qualifying for operation on the labyrinth. It should further be stressed that in Period I there were 14 cases of o. i. manifesta ex otitide media acuta and in Period II there were only 4 such cases. Considering the numbers of patients in the two periods, the incidence of otitis media manifesta e otitide media acuta may be estimated as seven times lower in Period II. The mortality in Period I was four cases (meningitis labyrinthogenes e otitide media acuta). In Period II there were no fatal cases in this group.

TABLE 5.—*Treatment of Otitis Interna Diffusa Manifesta*

Treatment	Period I		Period II	
	No. Cases	%	No. Cases	%
Labyrinth operation	15	41.5	21	80.5
Radical operation	1	2.5	1	4
Antromastoidectomy	4	11.5	3	11.5
Strictly conserv. treatment	16 *	44.5	1	4
Total	36	100	26	100

* Out of the 16 cases treated conservatively, 14 had contracted otitis media during scarlet fever. In Period II otitis interna scarlatinosa was not noted in our material.

O. I. Diffusa Latens.—In Period I, 33 cases were observed, and in Period II, 37. This group includes those cases of o. i. diffusa in the course of otitis media chronica which came to the Clinic without spontaneous signs of labyrinthitis. The ear was deaf; the caloric test negative; there was compensated or noncompensated nystagmus in the turning test, and sometimes peripheral paralysis of the seventh nerve.

Treatment of O. I. Diffusa Latens.—The percentage of labyrinth operations is here similar in both periods (54% and 48%). With regard to our experience of o. i. circumscripta generalisata in Period II, where the vicissitudes of the granulating process were treated with antibiotics, unexpected situations were not infrequently encountered. Quite often we decided on the labyrinth operation, especially where according to Zange's criteria an abscess on the porus acusticus internus might be expected. In this way we obtained, under antibiotic protection, secure and lasting healing conditions. In the labyrinth operation group, in Period I there were seven cases with preoperative paresis of the seventh nerve; in Period II there were eight such cases. The radical operation was performed in Period I in 30% of cases and in Period II in 48% of cases. Here antibiotic protection encouraged the setting in order of the middle ear spaces, and so helped the healing of the morbid processes in the inner ear. Continuous x-ray observation of the inner ear

TABLE 6.—*Treatment of Otitis Diffusa Latens*

Treatment	Period I		Period II	
	No. Cases	%	No. Cases	%
Labyrinth operation	18	54.5	18	48
Radical operation	10	30.5	18	48
Strictly conservative treatment	5	15	1	4
Total	33	100	37	100

TABLE 7.—*Complications of Otitis Interna Diffusa Complicata*

Complication	Period I		Period II	
	No. Cases	%	No. Cases	%
Meningitis	42	70	52	67.5
Cerebellar abscess	14	23.5	15	19.5
Cerebral abscess	--	-	5	6.5
Sinus thrombosis via saccus endolymphaticus	4	6.5	5	6.5
Total	60	100	77	100

(Wullstein) in these cases sometimes gives very useful indications. Unfortunately, this method of diagnostic aid could not be used as it should have been under our conditions. The mortality after labyrinth operations in this group calculated by Hinsberg amounts to about 2.5%. We had no fatalities in either of the two periods, apparently owing to our relatively small number of cases.

I shall not give a separate discussion of the nine cases in Period II which passed during clinical observations from the group of o. i. diffusa noncomplicata to that of complicata. They were observed and evaluated according to the criteria of Lund (stadium premeningeale), and were all saved.

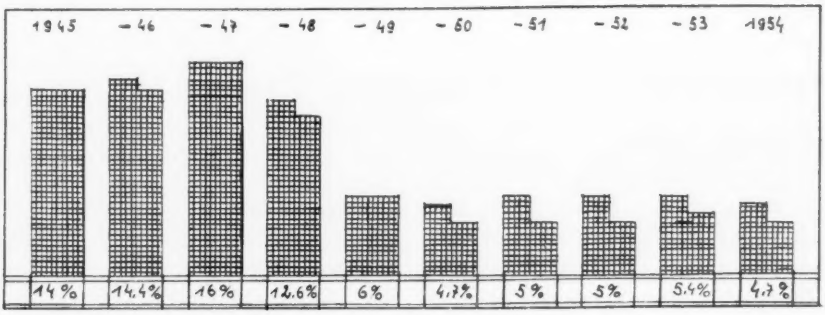
Otitis Interna Diffusa Complicata.—In all cases in both groups, various types of labyrinth operation were performed, with regard to the procedures required by the kind of complication. The mortality for o. i. complicata was 21 cases (35%) in Period I, and 15 cases (19.5%) in Period II. We may say of the group of fatal cases that Period II is decidedly more favorable than Period I. In Period I the mortality rate was 21:60, i. e., 35%. In Period II the rate was 15:77, i. e., 19%.

It should also be emphasized that in the first five years of Period II the quantity and variety of antibiotics were very small in comparison with what was available in the last years of the same period, and that the mortality of the last five years was twice as low as in the first. As regards the cerebral abscesses in this material in Period II, they are not considered as complications of labyrinthitis, with the exception of one (via ampulla sagittalis). The others were complications from the middle ear spaces, which had had an opportunity of developing through the unsuitable application of antibiotics. According to our experience, the role of the saccus endolymphaticus in the origin of cerebellar abscesses is indubitably important. If a suitable operative technique is used, this route of complication is usually clear enough to be diagnosed on the operating table. Considering that the number of cases of otitis interna in Period II were recruited from a morbid material about twice as large as in Period I, we may say that in Period II the frequency of labyrinth cases has dropped significantly. As up to the present we have not observed any parallel drop in o. i. circumscripta (Graph 1) for the reasons already mentioned, the greatest drop relates to o. i. and otitis media acuta, with an incidence seven times as low as previously. In Period II the frequency of labyrinth operations calculated in relation to the total number of patients has dropped significantly. If, in spite of this, in the absolute figures the number of labyrinth operations is still considerable, this is to a certain extent dictated by social considerations. In a series of cases of labyrinthitis latens and manifesta the labyrinth operation solved with speed and safety a situation in which only long-continued observation—and even that not always—could have given certainty that the labyrinthine process was entirely healed and had become innoxious.

TABLE 8.—*Mortality in Otitis Interna Complicata*

Complication	Period I		Period II	
	No. Cases	%	No. Cases	%
Meningitis	8	38	9	60
Cerebellar abscess	11	52.5	4	27
Sepsis from perilabyrinthine focus	2	9.5	1	6.5
Cerebral abscess	0	0	1	6.5
Total mortality	21	100	15	100

The mortality in relation to the o. i. complicata group amounted to 21:60 (35%) in Period I, and to 15:77 (19.5%) in Period II. In relation to the whole group of o. i. diffusa this therefore amounts to 16% in Period I and 10.7% in Period II. The mor-



Graph 2.—The numbers below the columns show the percentage of cases in which otitis interna appeared during otitis media. The columns show the number of cases of otitis media treated each year. (Data given by Sekula.)

tality for the whole material of o. i., i. e., 212 cases in Period I and 250 cases in Period II, amounted to 10% in the first period and 6% in the second. If we take into account the fact that the mortality during the last five years of Period II is more than twice as small as in the first years of Period II, we ascertain that finally it amounts to less than 3%. In addition to this, it should be stressed that the percentage of otitis interna calculated in relation to the total number of cases of otitis media has fallen considerably (Group 2).

A comparison of the past and present mortality from o. i. indicates that there has been an essential turning point in these problems. Of course, the mortality is not the only aspect of o. i., although it is the most striking. We are fully aware that the indications for the labyrinth operation were wide in the periods considered. In the group admitted to the Clinic as otitis diffusa non-complicata, we had no fatal cases, while in the group of labyrinthitis latens cases,[37] when the radical operation was performed as a decompressive procedure under the protection of antibiotics, we had four cases of meningeal complications—in one case one month after operation, and in the three others from four to nine months afterwards. This encourages us to maintain our radical attitude towards such cases, of which the absolute number is fortunately constantly decreasing.

The broad indications for labyrinth operations, even in Period II, resulted from the fact that many patients come from small remote villages, so that contact with the clinic is not very easy. The indications for operation are formulated in such a way that it is certain that the morbid focus is quickly and definitely dealt with.

Gabarska 13, W.

Virus Disease of the Respiratory Tract

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When man considers his environment he should not be surprised that respiratory infections are common. Certainly the respiratory tract represents a portal of entry over which we do not have too much control. Usually we can forego a meal which does not appeal to us or one which we find offensive or suspect of being polluted. Such a choice is indeed limited as concerns the air we breathe. Consequently the list of agents entering by way of this route which can cause disease is long. The filtering capacity of the pulmonary capillary bed is great; therefore in systemic infections, neoplasms, and in other situations a considerable number of factors may give rise to symptoms and increased density by way of roentgenographic record.

For lack of time all of the conditions with which viral infections might be confused cannot be discussed. Allergic manifestations, toxic drugs, irritants, fungal and bacterial infections, respiratory tract involvement as a part of systemic disease—all of these should be kept in mind during the consideration of respiratory viral disease.

Quantitative differences among viral diseases must not be overlooked. If one were of a mind and took the time, he could prob-

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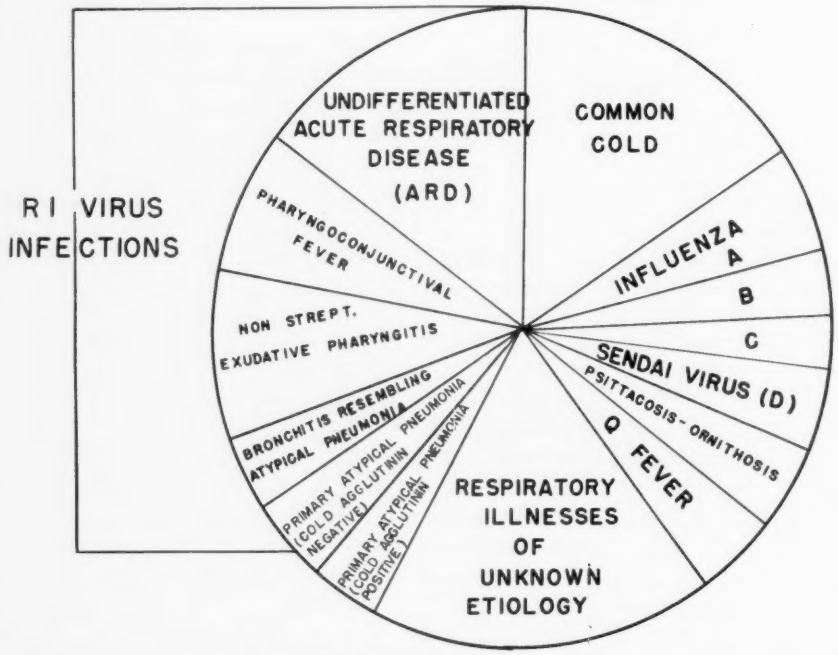


Fig. 1.—Respiratory illnesses of man.

ably select patients to represent a progressive gradation of severity of signs and symptoms, beginning with subclinical infection, proved in the laboratory, progressing through the common cold, eventually to arrive at a fatal case of psittacosis. When infections caused by just one virus, such as the adenovirus, may vary from subclinical disease to a severe pneumonia, the problems involved in making a clinical diagnosis of the viral infections become apparent.

Some of the commoner respiratory infections encountered today and their relationship to one of the more recently isolated causative agents may be seen listed in Figure 1. This figure is a slight modification of the one originally proposed by Dascomb and Hilleman [1] in that the Sendai virus has been added.

The various infections represented here are not given accurate proportionate area. This would be impossible and still enable one to label some of the segments. The common cold still remains one of the commoner infections, and the precise causative agent remains elusive. Several infections bearing different clinical names have been found to be caused by the adenoviruses. It is interesting to note that there seems to have been a legitimate reason as to why not all cases of primary atypical pneumonia had cold hemagglutinins and/or MG Streptococcus agglutinins. The negative reactors appeared to have their disease caused by adenovirus and the positive reactors perhaps yet another virus. Influenza caused by the various types of this virus remains a common epidemic respiratory disease. It has been suggested that a type D be added to incorporate the Sendai virus in this family.[2] This last virus was first isolated in Japan and claimed to be the cause of newborn pneumonitis. Recently from England [3] comes the report of rising antibody titers against this virus during respiratory infections, leading one to believe the old as well as the young may become infected. Psittacosis-ornithosis and "Q" fever complete the circle and the group about which the discussion will center.

The patient usually makes his own diagnosis when the common cold is involved. The picture of suffused eyes, husky voice, abundant watery nasal discharge, fairly intense congestion of the upper respiratory tract mucosa obstructing breathing is clear to us all. Certain points are worth emphasizing, however, to avoid confusing the common cold with other respiratory infections which may mimic it somewhat closely. In the common cold marked malaise and prostration are not a part of the picture. The infection is afebrile in adults; however, in children a temperature of 102 F is not uncommon. The throat reveals a slightly shiny and edematous appearance of the mucous membranes with some swelling and redness of the lymphatic aggregations. A postnasal drip may be present, but a true exudate on the tonsils or pharynx is not a part of the picture. In heavy smokers it may be difficult to note any changes in the throat during an attack of the common cold. Laboratory findings are normal. If a leukocytosis is present, it strongly suggests a bacterial complication.

Certain specific diseases such as rubeola, rubella, varicella, pertussis, etc., may, in the catarrhal stage, be indistinguishable from the common cold. Allergic rhinitis requires a careful history to rule it out. The very rapid development of symptoms, lacrimation, sneezing, itching, and the pale boggy appearance of the turbinates are fairly characteristic. An allergic element may be present in the common cold since delayed hypersensitivity reactions to other viral suspensions have been demonstrated.

You will recall from Figure 1 how many clinical syndromes are caused by the adenoviruses: undifferentiated acute respiratory disease, nonstreptococcal exudative pharyngitis, pharyngoconjunctival fever and primary atypical pneumonia.

Some very illuminating studies on adenovirus infections have been made in the military establishments. A certain amount of caution should be used before applying these findings to civilian populations. For obvious reasons their studies apply to a relatively

uniform and limited age group. The respiratory disease outbreaks occur following the convening of large numbers of people from different parts of the country into relatively close proximity. For purposes of maintaining an effective training program only those of a certain degree of illness are used for study. Not uncommonly an arbitrary minimal temperature is selected for admission. Rigors of basic training may constitute an uncommon set of exposure circumstances as far as civilians are concerned. One respiratory infection not uncommonly may superimpose itself upon another.

As one would expect from the list of clinical syndromes caused by the adenoviruses, the symptoms and signs will cover a wide range. Inoculation experiments [4] using cultured virus resulted in very mild illness or in some cases no illness. Infection in the latter group was established by the development of antibodies against the inoculated strain. Among some of the severer natural infections feverishness, pharyngitis, cough, hoarseness, malaise, myalgia, headache, and asthenia usually increase gradually over the period of a few days. Less commonly an abrupt onset of chills and fever may occur with the other symptoms becoming manifest within 24 hours. Fever of 100-104 F is recorded and lasts from 2 to 12 days. Throat symptoms vary from a scratchy feeling to severe pain. Examination reveals intensely red and edematous mucous membranes over the tonsillar area. The pharyngeal mucosa, although edematous, is less red. A moderately severe case is shown in Figure 2. Before the third day of the disease it may be difficult to note any exudate over the hyperplastic lymphoid tissue or pharyngeal mucosa. By the fourth day at least half of the patients show some degree of whitish exudation, which is usually gone by the seventh day. The exudate varies from punctate to confluent, is adherent to underlying tissue, and is not surrounded by an erythematous areola. Cervical lymphadenopathy is present in about half of the cases. In the severer attacks by adenovirus ruling out infection caused by Streptococcus pyogenes without culture may be difficult.

Fig. 2.—A moderately severe case of adenovirus infection.

In some patients the infection may spread downward to produce laryngitis, tracheobronchitis, and pneumonitis. The pneumonic involvement has been variously reported as from 4% to 16% of the cases in some studies.[5,1] White blood cell reactions are variously reported as from 7100-33,000/cu.mm.,[1] to mild leukopenia.[6] The majority of the student cases we have seen would fall in the latter category.

Conjunctivitis has been reported as present in approximately half of the cases in some studies [6] and entirely absent in others.[5] When it occurs it is usually bilateral and mild, with erythema and granularity of the conjunctivae. The limbus and region of the inner canthi are more particularly involved. Exudate is usually small in amount but enough to cause crusting of the eyelids during sleep. The patient usually complains of a scratchy sensation in his eyes. Outbreaks of pharyngoconjunctival fever occur among school children, and individual cases have been diagnosed as "cold in the eyes" and "pink eye."

While adenovirus infections may peak during the winter months, the incidence is reasonably well spread throughout the year. Influenza may occur sporadically but by all odds is a seasonal disease with the greatest incidence during the winter months. The

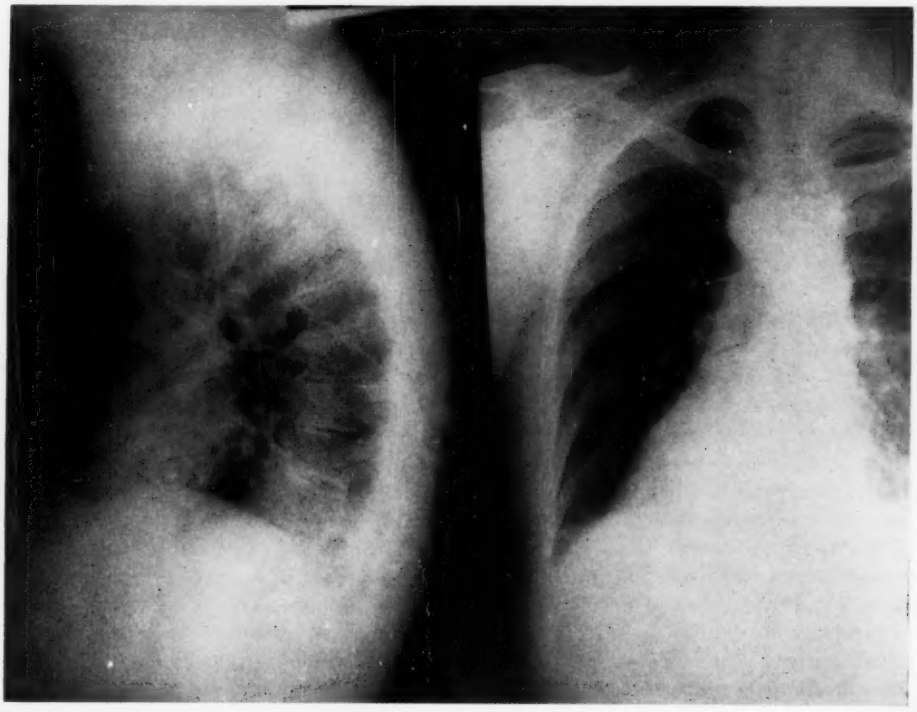
outbreaks are usually quite sharp, with a number of persons afflicted within a short time. Epidemics of any one year may be milder than those of another and the severity may vary from case to case. The first cases are usually not too typical and are misdiagnosed, but, when a number of people start coming down with a prostrating illness within a few days, influenza is suspected.

The incubation period is short, one to two days. The onset is abrupt, and the most prominent symptoms are constitutional. They include chilliness or frank chills, fever, headache, malaise, anorexia, and muscular pains. Varying degrees of prostration are common. At first symptoms referable to the respiratory tract are not pronounced, consisting of sneezing, a feeling of fullness or dryness in the nasopharynx, larynx, and trachea. Cough and substernal soreness follow later. Fever is of the remittent variety, usually between 101 and 103 F, highest on the first or second day and lasting two to three days.

The physical examination does not reveal much specific information. The conjunctivae may be injected and the face flushed. A diffuse moderate increase in redness may be present over the faucial pillars and oropharynx. The nasal mucosa may be somewhat injected and swollen. Clinically apparent pneumonia in influenza is uncommon. Usually, except for fine moist rales over the base of the lungs posteriorly, little can be found. After being acutely ill for three to five days, barring complications, the patient usually feels better, although the cough, productive of small amounts of mucopurulent sputum, may persist for a week or more.

In the course of a respiratory illness a pain in the chest, productive cough, increased difficulty in breathing, development of rales or signs of increased density sug-

Fig. 3.—Anteroposterior and lateral roentgenograms showing moderate virus pneumonia.



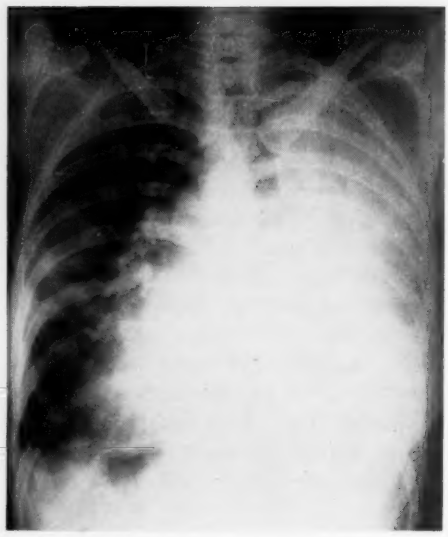


Fig. 4.—Roentgenogram showing severe virus pneumonia.

gest taking a roentgenogram. To encounter considerably more pulmonary involvement indicated in the film than suggested by the physical examination leads the physician to believe he may be dealing with primary atypical or viral pneumonia. If the patient's pulse, respiratory rate, and white blood cell count are within normal limits or only slightly elevated, he feels more inclined toward this diagnosis. Excluding bacteria by culture as the cause of the pneumonia is important. Figures 3 and 4 show moderate and severe virus pneumonia.

A variety of agents can cause the roentgenographic picture of "viral pneumonia." Pulmonary tuberculosis, tularemia or other bacterial pneumonias may do so. Fungi such as Histoplasma capsulatum or Coccidioides immitis may produce pulmonary changes difficult if not impossible to distinguish from "viral pneumonia." Viruses and Rickettsiae are, however, the concern of this discussion. The role of adenovirus in producing pneumonitis has already been mentioned. Members of a broad group of agents known as the psittacosis-ornithosis viruses and Rickettsia burneti (Coxiella burnetii) must be considered when a diagnosis of viral pneumonia is entertained. Epidemiologic, therapeutic, and prognostic considerations make it advisable to determine which of the agents is involved as soon as possible.

The incubation periods, onset, symptoms, signs, and course of infections caused by viruses and Rickettsiae mentioned above can be quite similar. To learn of the patient's contact with fowl may help in suspecting the ornithotic agents. The list of fowl that may serve as a source grows longer by the year. Parakeets, chickens, doves, ducks, pigeons, and turkeys do not exhaust the possibilities. Not infrequently the patient fails to remember the contact, which may have been a short but close observation of birds in a store.

The Q fever patient most likely obtained his infection from farm animals, their products or materials contaminated by them. This connection may prove a bit remote at times such as in the case of persons processing wool or hair. Straw used in packing came under suspicion as causing one outbreak.

Although reported cases of human to human transmission are believed to occur they are not common. It would seem advisable to practice reasonable caution to prevent such a possibility, however.

From what has been said thus far it should be apparent that accurate clinical diagnosis of specific viral infections can be most difficult. To differentiate between the common cold and viral pneumonia at some stage is easy. But to tell the common cold from mild adenovirus infection, adenovirus pneumonia from psittacosis and Q fever presents a real problem.

Specific diagnosis rests with the laboratory equipped to study viral diseases. The practicing physician wishing to obtain such specific information has certain responsibilities. Supplying a tentative diagnosis, the date of onset of the present illness, and the day of illness upon which the particular specimen is submitted are important information the virologist needs. Listing previous immunizations, if any, also helps

interpret results. Blood, nose and throat washings, nasal and throat swabs, pleural fluid, and sputum are specimens more commonly submitted for study where respiratory viral infections are suspected.

As early in the disease as practicable 5-10 ml. of blood should be submitted. A second specimen should be submitted 7 to 10 days later. A rising titer of antibody is necessary for a positive diagnosis; hence the two spaced specimens. A third specimen may be required after an additional week. Patients with psittacosis may not show an antibody rise for several weeks, especially when antibiotic therapy is started early, but this does not often present a problem. Submitting whole clotted blood allows the laboratory worker maximum leeway for study. If cold hemagglutinins are requested, the blood should not be refrigerated, or, if it has been, this should be so stated on the requisition. Anticoagulants should not be used unless specifically requested.

Nose and throat washings for culture may be obtained by letting 10 drops of saline flow down each of the patient's nostrils while his head is tilted back. He then gargles deeply with 10-15 ml. of the fluid and expectorates the specimen into a paper cup. An easier method is to collect nasal and pharyngeal exudates on cotton swabs. The swabs are kept moist in 1.0 ml. of saline in the bottom of the tube used to transport the specimen. Prompt delivery of specimens increases the chances of obtaining reliable information. If antibiotics or sulfonamides were started before the specimens were drawn, it should be indicated.

From which cases specimens are to be taken for virological study rests with the physician. He must distinguish between what would be the ideal and what would be the practical way to study which cases.

The State University of Iowa College of Medicine.

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Direct Prelabyrinthine Petrotomy and Extended Tympanomastoidectomy

The First Operation of This Kind with Preservation of Labyrinthine Function

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It has been commonly believed that the first extended tympanomastoidectomy with the preservation of the internal ear was performed by Ramadier in a case of acute petrositis, and in the world medical literature this operation has usually been connected with his name. He first reported it in an article entitled "Les Symptômes de foyers intrapétreux au cours des otites aiguës," in *La Presse médical*, Feb. 4, 1931.

This operation, however, has wider indications, and because of these, had been performed before. It may be employed for the removal of tumors, for traumatic lesions, for chronic prelabyrinthine petrositis with cholesteatoma formation, foreign bodies, etc. Its main purpose is to deal with the pathological lesion situated in the prelabyrinthine part of the pyramid and of the adjoining anatomical structures, at the same time preserving the function of the labyrinth. The possibility of achieving this purpose was mentioned as late as 1928 by Zange, who expressed doubts as follows: "The apex of the pyramid can be reached only by sacrificing the internal ear" (*Arch. klin. Chir.* 152: 335, 1928). However, before that time, on Jan. 8, 1927, I was able to present to the Czechoslovak Otorhinolaryngological Society the case of a child, aged 5½ years, who had undergone an operation of this kind. This child fell sick on Dec. 20, 1926, with a head cold and an elevated temperature. Three days later he developed right-sided stabbing earache, and the ear commenced to discharge two days later. As the child was complaining of severe headache and had a chill, admission to our department was arranged on Dec. 26, 1926. Physical examination disclosed swelling and pressure tenderness at the tip of the mastoid process and behind the mandible. The external meatus contained pus and was greatly narrowed at the juncture of the cartilaginous and osseous parts, preventing visualization of the tympanic membrane. A probe could be passed into a fistula situated in the lower wall. This led in a downward and forward direction to a considerable depth. Hearing for whispering was reduced to 0.2 meters; temperature raised to 38.2 C (100.8 F).

Surgical exploration of the mastoid process was carried out on Dec. 27, 1926—disclosing only minor lesions—and a subcranial abscess was drained.

During the following days major hemorrhages into the abscess cavity kept recurring. First of all, on Jan. 4, 1927, the external carotid artery was ligated, and as this failed to stop hemorrhage, the internal carotid was also ligated. As this also failed, and the hemorrhage obviously persisted from the peripheral end of the internal carotid, closure of it was carried out directly inside the carotid canal in the following way (textual quotation):

> Entering by a retroauricular incision, the meatal wall was cut transversely at the juncture of its osseous and cartilagenous portions [Fig. 1] the joint capsule was dissected from the anterior surface of the tympanic bone up to its juncture with the pyramid. The anterior wall of the bony auditory canal was then chiseled off [Fig. 2], proceeding deeper across the musculotubal canal and through the anterior wall of the tympanic

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cavity at its lower half. The carotid canal was now opened, the carotid artery exposed for a length of about 12 mm. and packed firmly into the bony groove of the opened carotid canal. This produced sufficient closure of the artery, as bleeding did not recur after removal of the provisional pack from the abscess cavity.

The operation was concluded by the removal of the posterior and superior walls of the osseous meatus, as far as these still remained after the previous operations, and by meatoplasty.

The child died on Jan. 12, 1927, from damage to the blood supply of the brain. The foregoing account of the operation shows that on Jan. 4, 1927, there were performed for the first time: (1) direct prelabyrinthine petrotomy; (2) extended tympanomastoidectomy with preservation of labyrinthine function.

A short report on the child to the Czechoslovak Otolaryngological Society after the operation appeared in the *Časopis lékaru českych*, Prague (66:1489, 1927), and a detailed account in the *Liječnički Vjesnik*, Zagreb (11:1391, 1928).

In this work besides the description of the above-mentioned operation the question of hemostasis of bleeding from the internal carotid artery in the region of the temporal bone is treated in a more detailed way. There is also mentioned another case of bleeding from the internal carotid artery in case of a peritubal abscess which developed during a chronic otitis media. At that time (1926) a tympanomastoidectomy was executed and profuse arterial bleeding occurred when the anterior wall of the Eustachian tube was curetted. A plug was packed into the tube enlarged during the operation and to the exposed artery in the carotid canal, and in that way the bleeding was completely stopped. This packing was left in situ for 22 days. The patient recovered and during observation for several consecutive years no difficulties were discovered.

On the basis of experiences from these two cases and on the basis of dissections on specimens I worked out an operative method for the ligature of the internal carotid artery in the carotid canal which would evidently be a method of choice for cases of bleeding from the peripheral end of the carotid close to the external carotid porus.

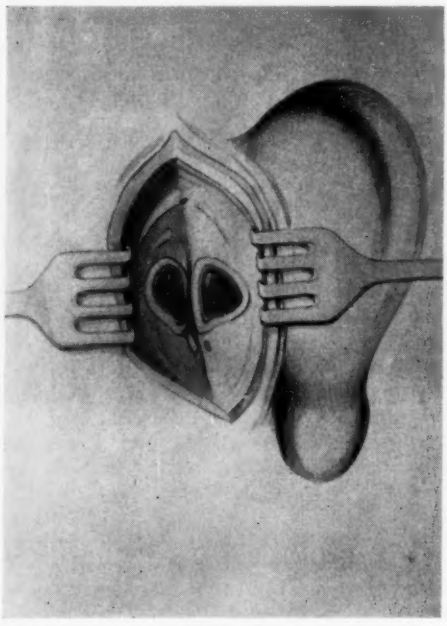

Figure 1

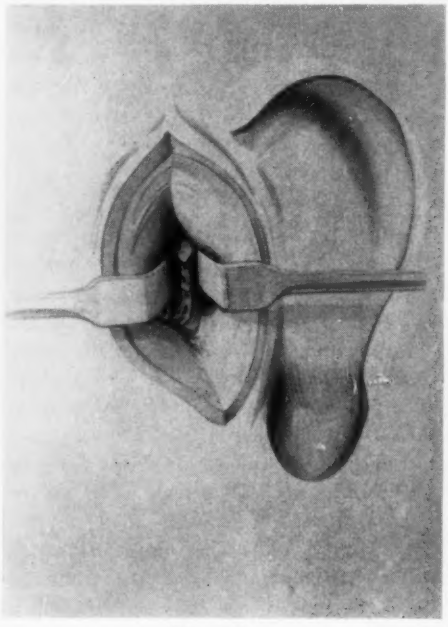

Figure 2

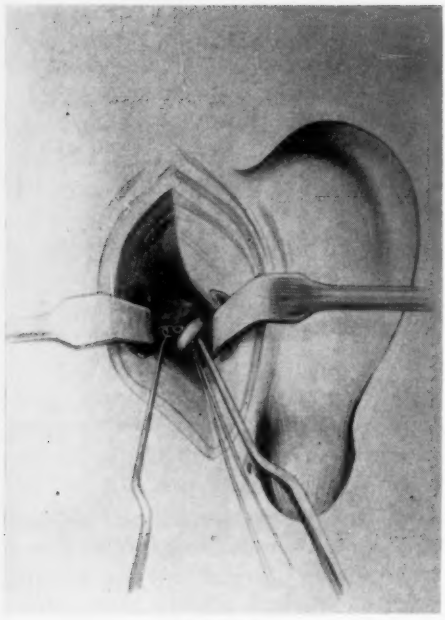

Figure 3

I used the same procedure as in the case of the first operation mentioned: By a retroauricular incision, proceeding across the meatus as shown in Figure 1, and, after cutting off the anterior wall of the bony meatus (Fig. 2), I proceeded across the tympanum and the Eustachian tube into the carotid canal, where, by means of a fine instrument for introduction of a thread round the exposed artery (Fig. 3), I executed a ligature.

As early as the year 1865 Friedlovsky found out that the carotid canal can be opened in this place by dehiscence and so it can be converted into the carotid sulcus. Of course, the thinner the wall of the carotid canal or the greater its dehiscence, the easier is access to the vessel in the described operation. Also the relation of the labyrinth to the carotid canal varies, as was stated by Bellocq. According to this author the carotid canal is situated either in front of the cochlea and a little inward from it, or more often, it is situated partly outward from the cochlea. The first position makes the operation more dangerous because of possible damage of the cochlea by mistake. It can be concluded from this that it is safer to proceed to the carotid canal from its anterior wall and eventually across the tympanic ostium of the Eustachian tube. In that way the vessel may be exposed as much as 1.5 cm. in its length.

All these data are published in my paper of 1928. There are many further details, but it is quite clear from what has already been cited that in this paper the procedure in the prelabyrinthine part of the pyramid with preservation of the function of the labyrinth was elaborated in all details and that this procedure was already applied at the time of the first operation described (Jan. 4, 1927), including the exposure of the carotid artery. Only I have not had any opportunity of performing the ligature of the carotid artery itself, as I have not treated any further case of such bleeding.

Ramadier himself in 1933 (Société Française d'Otolaryngologie, Congrès, 1933) cites my paper of 1928 as the publication of a method for hemostasis in the carotid canal, without mentioning either the procedure in this proposed operation or the procedure followed in the case described there in full detail. He has not mentioned at all in what way access to the carotid canal was obtained.

The pictures here reproduced are photocopies of the original pictures published in the above-cited publication of 1928.

17 Karmelitská (III).

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Surgery of Extensive Malignant Neoplasms of the Upper Digestive and Respiratory Systems

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Introduction

In this paper there are presented the detailed histories of two cases in each of which an operation had to be planned to deal with an extensive malignant neoplasm of the upper parts of the digestive and respiratory systems. These are then discussed in the light of a brief review of the literature and experience of other cases. While such operations have to be varied in detail to suit the particular case, emphasis is placed here on the underlying general principles observance of which may mitigate failure. It is hoped that the conclusions reached may prove of use to others.

Report of Cases

CASE 1.—A 64-year-old man, with a severe chronic bronchitis, addicted to drinking much beer and to smoking, presented with a history of mouth discomfort for one week. He had a large carcinoma inside the left cheek involving the mandible at the junction of the body with the ascending ramus, the posterior part of the hard and soft palate on the left, the left anterior faucial pillar, and the posterior part of the floor of the left maxillary sinus. The extent of the lesion, and its involvement of bone, precluded curative radiotherapy. The following operation was performed in July, 1955, under endotracheal anesthesia (Dr. W. Hegarty). An incision was made, starting in the midline under the chin, curving downward and backward to the hyoid bone, and then up to the left mastoid process. A flap of skin and platysma was elevated. The external carotid artery was ligated in continuity. A jugulodigastric lymph gland—which did not seem malignant—was removed; subsequent histological examination confirmed that it contained no malignant cells. It was not considered wise to perform a block dissection of the neck in addition to the main surgery contemplated on this not very fit subject. The lymph glands related to the submaxillary salivary gland were hard and their appearance suggested malignancy; the submaxillary gland with its related lymph glands was excised; histological examination later did not confirm neoplasia in these tissues. The flap of skin and platysma was dissected upwards as in Patterson's (1937) operation for carcinoma inside the cheek. Most of the left body and ascending ramus of the mandible, including, of course, the angle, were then removed. It is theoretically advisable to remove this bone en bloc with the neoplasm inside the mouth, but in practice this may be difficult. Gardham (1953) also mentions this matter, and states that he has not seen any harm result from preliminary separate removal of the bone. The mouth was then opened, and, with a gauze pack under the superficial flap, with use of diathermy and an osteotome, there were excised the left side of the soft palate, including the uvula, the posterior part of the left cheek intraorally, the posterior part of the hard palate and floor of the antrum, the left tonsil, including the anterior and posterior faucial pillars down to the root of the tongue, and the lateral pharyngeal wall up to the Eustachian tube opening in the nasopharynx. It then occurred to me that the posterior part of the excision by diathermy could have been rendered safer and easier—and therefore more thorough—if I had isolated the internal carotid artery and surrounding nerves in the neck up to the base of the skull and retracted these out of the way. There is always fear, when one uses diathermy near a large blood vessel, that this may be damaged in advance of the needle. The pterygopalatine area was treated with diathermy. The neoplasm was contained within the excised mass of tissue. It was obviously impossible to close the operative defect by mucosal suture. It was not considered advisable to cover the denuded areas with a split-thickness skin graft because (*a*) I wanted to be able to inspect the area postoperatively closely for possible recurrences that might be readily accessible to further diathermy, and (*b*) I doubted whether the patient could stand the large stent mould, with the mouth in an open position, that such grafting would have required. The divided Stenson's duct was left lying

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free inside the cheek. The incision was partly sutured, being left open at its center, where a gauze swab, impregnated with bismuth-iodoform-paraffin paste, was placed, communicating the oral cavity with the outside. This drained saliva, reducing the danger of infection in the neck and reducing the amount of saliva the patient had to swallow postoperatively; the significance of this will become apparent later. A tracheotomy, through a short transverse incision just above the suprasternal notch, so that it should be as far as possible from the field of the main operation, was then performed, and also a gastrostomy (Mr. J. M. Saunders). Two pints of blood were given slowly during and after the operation, the patient's hemoglobin preoperatively being subnormal. The postoperative course was complicated by a severe exacerbation of the chronic bronchitis, and auricular fibrillation. These complications responded to antibiotics—administration of which had been commenced preoperatively—digoxin, administration of no sedatives other than acetylsalicylic acid or paraldehyde, breathing exercises, occasional postural drainage, getting him up into a wheel chair within a few days of the operation, and, especially, frequent suction through the tracheotomy. After a week, it was thought that some of the excessive tracheal secretion might be due to irritation by the tracheotomy tube, and this was left out, suction through the stoma still being possible for some days; improvement set in from that time. It was observed that the interference with swallowing resulted in pooling of saliva in the hypopharynx, with spill-over into the larynx. The mouth also was kept clear by intermittent suction. That some of the saliva could drain into dressings through the open part of the incision was a great help from this point of view. Constant suction appliances such as those employed by dentists to keep the mouth dry while filling teeth were not tolerated for long by the patient. He was nursed in a sitting-up position; he would not have tolerated postural drainage for long. Gradually, with the aid of much necessary encouragement, he resumed swallowing, and the fistula in the incision and the gastrostomy were allowed to close. Soft diet was taken more easily than fluids or solids. The raw area in the mouth and pharynx epithelialized over in a few months; no undue contracture occurred; a strip of mucosa about ¾ in. deep had been preserved just inside the angle of the mouth. If this area also had had to be denuded of epithelium, split-thickness skin or whole-skin-pedicle grafting would have been highly advisable to prevent contracture closure of the mouth.

The patient returned home two and a half months after the operation, and resumed his oc-

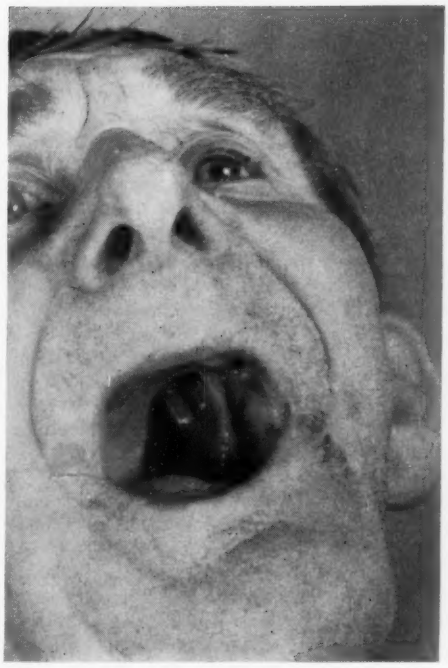


Fig. 2 (Case 1).—Another view of the same patient as in Figure 1 after the first operation.

Fig. 1 (Case 1).—Photograph of patient after the first operation.

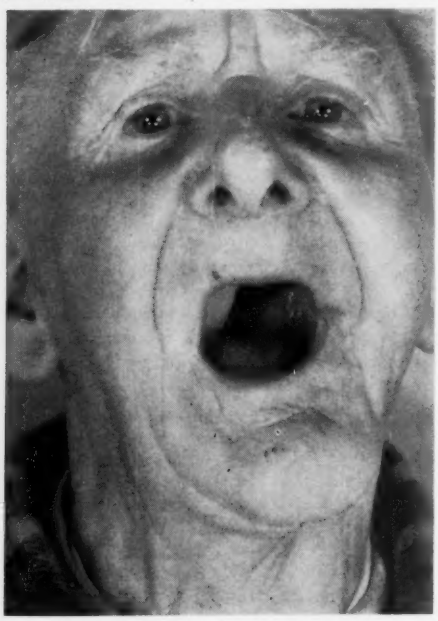
cupation in a brewery. His appearance at that time is depicted in Figures 1 and 2. His speech, although of open nasal type, was quite distinct, and he had no feeding difficulty. The preparation of a prosthesis to replace the removed parts of the palate was started.

Seven months after the operation a submucous nodular area about 2×1 cm. became visible and palpable just underneath the left Eustachian tube opening in the nasopharynx. This was considered unsuitable for radon implantation and was treated with deep x-rays (Dr. J. F. Bromley). This greatly reduced the size of the neoplastic infiltration for about a month, after which, however, it enlarged again very rapidly. Further radiotherapy, Dr. Bromley considered, would only add to the patient's distress.

I therefore decided to see what could be done by further surgery. His bronchitis, however, was so severe at this time that operation had to be postponed while he was treated by postural drainage, breathing exercises, and antibiotics; these measures improved his chest slightly. Meanwhile the growth increased in size rapidly; it is visible in Figure 3; it had reached proportions of approximately 1½ by 3 in., and extended downwards from, and including, the Eustachian tube cushion.

The following operation was carried out under endotracheal anesthesia (Dr. D. R. Rigg) in June, 1956. The upper part of the previous incision was reopened, and extended downwards along the sternomastoid muscle. (This is a useful incision for many extensive procedures in the neck.) The carotid sheath with its contained vessels and nerves was isolated up to the base of the skull. This was difficult, owing to scar tissue from the previous operation and many crossing veins; this isolation is probably much easier after a block dissection of the neck. The hypoglossal nerve was isolated and preserved. The posterior belly of the digastric and the stylohyoid muscle was divided. The pharynx was palpated from outside; the growth was found not to have transgressed the buccopharyngeal fascia except at its lower pole. Gauze was placed between the pharynx and the carotid sheath and tape looped around the common carotid artery for use "in case of accidents." The growth was then dealt with through the mouth by diathermy coagulation. This left a large opening in the lateral pharyngeal wall which could not be closed by suture; the mucosa could also not be sutured to skin, the pharyngeal opening being so high. The sternomastoid muscle was divided just above the clavicle and reflected upwards, care being taken to preserve the vessels entering its upper third, and it was then laid over the carotid sheath and against the pharyngeal opening; it was anchored with a few absorbable surgical sutures. The skin was then loosely sutured, a drain being left in the lower part of the wound. A feeding tube was passed through the nose into the stomach, and the larynx was examined: there was no laryngeal edema.

Fig. 3 (Case 1).—Photograph showing the submucous recurrence of carcinoma in the left lateral pharyngeal wall.



Postoperatively, the patient developed a very severe exacerbation of his purulent tracheobronchitis and bronchopneumonia. This may have been due partly to difficulty in swallowing saliva, which pooled in the hypopharynx and spilled over into the larynx. He made little effort to clear himself, putting up even less of a fight than after the first operation. The mouth was kept clean by frequent suction, and, on the day after operation, the old tracheotomy was reopened under local anesthesia to facilitate clearing the tracheobronchial tree by frequent suction. Antibiotic administration was continued, oxygen supplied, the heart supported with digoxin and nikethamide, aminophylline administered, and breathing exercises carried out, but he died one week postoperatively. Autopsy (Dr. A. P. Prior) showed death to be due to the purulent tracheobronchitis and bronchopneumonia; the lungs were also emphysematous; the neck was healing well, there having been no infection or leakage of saliva into it; the kidneys showed arteriosclerotic degeneration. Incidentally, a chest x-ray taken on the day before death showed clear lung fields; this is a not

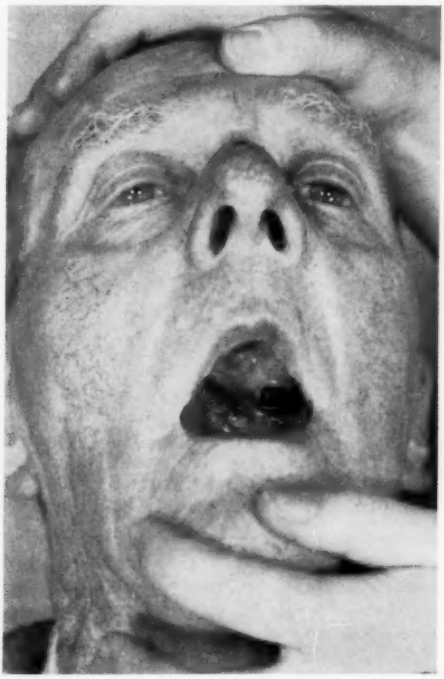


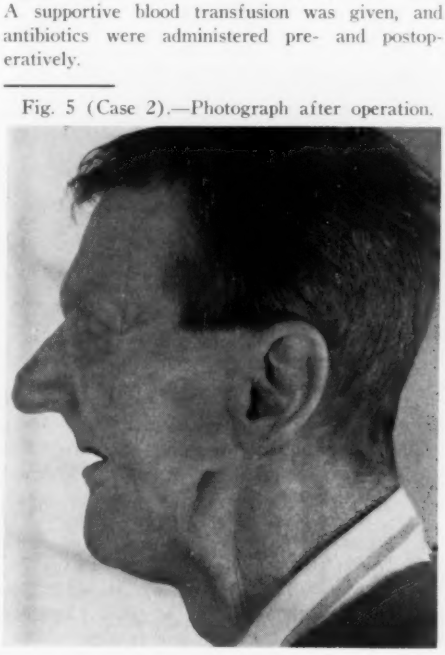
Fig. 4 (Case 2).—Photograph showing the ulcerated malignant sialoma of the palate and adjacent structures.

uncommon finding in even severe hypostatic bronchopneumonia in the elderly.

CASE 2.—A 77-year-old man was referred because of left-sided epistaxis. Some blood clot was to be seen far back in the left nasal cavity. Inspection of the mouth showed an enormous ulcerated neoplasm (Fig. 4) involving hard and soft palate, mainly on the left but also on the right, and the left ascending ramus of the mandible. Examination of the nasopharynx showed that the left lateral attachment of the palate and the region of the Eustachian tube orifice were also involved. X-rays showed involvement of the left nasal antrum and of the nasopharynx. He was very deaf, apparently mainly from presbyacusis, but the Rinne test, while positive on the right, was negative on the left. It transpired that seven years previously he had had radiotherapy elsewhere for a malignant growth of the palate, but had not attended for follow-up.

The following operation was performed under general anesthesia (Dr. R. Shaw) in October, 1955. The left ascending ramus of the mandible was removed, except for the condyle, subperiosteally, through a short incision along the lower posterior border of the mandible. The left cheek was split horizonally backwards from the angle of the mouth to just in front of the external maxillary artery and vein; the upper and lower margins of the split were temporarily straddled with Michel clips; the split was repaired at the end of the operation by mucosal sutures of gut and muscle and skin sutures of silk. An extended sublabial Denker's incision was made with diathermy; the left maxillary antrum was opened, and, with diathermy, a large malignant neoplasm involving the hard and soft palate on both sides, the left maxillary antrum, floor of the nose, pterygoid fossa, the side of the nasopharynx and the upper part of the tonsil was excised, including the whole left tonsil and related faucial pillars, in one block. A small piece of the nasopharyngeal end of the left Eustachian tube was also removed, but a small remnant of growth was left in the posteromedial region of the tube; this was coagulated with diathermy as far as was thought safe with regard to the proximity of the internal carotid artery. The lower part of the antronasal wall, including the inferior turbinal, and the lowermost part of the nasal septum, were also removed. The roof of the antrum and the ethmoids appeared all right. The left tear duct was divided during the operation; neither epiphora nor dacryocystitis developed postoperatively. The internal maxillary artery was ligated in the operative field. The wound at the angle of the lower jaw was left open, with a gauze wick in it extending into the mouth. The operative cavity was lined with oxidized cellulose (Oxycell) gauze. A tracheotomy and gastrostomy (Mr. L. L. Hoare) were done. A supportive blood transfusion was given, and antibiotics were administered pre- and postoperatively.

Fig. 5 (Case 2).—Photograph after operation.



Postoperatively, the tracheobronchial tree was kept clear by suction through the tracheotomy tube; the chest stayed clear so well that this tube was omitted on the third postoperative day. The mouth was kept clean by occasional suction, picking out crusts, and spraying with bland lotions; it healed satisfactorily, as did also the wound at the angle of the lower jaw, which allowed escape of saliva during the first few days while swallowing was painful. The gastrostomy was permitted to close after about eight weeks, when he was taking soft diet (Figs. 5 and 6).

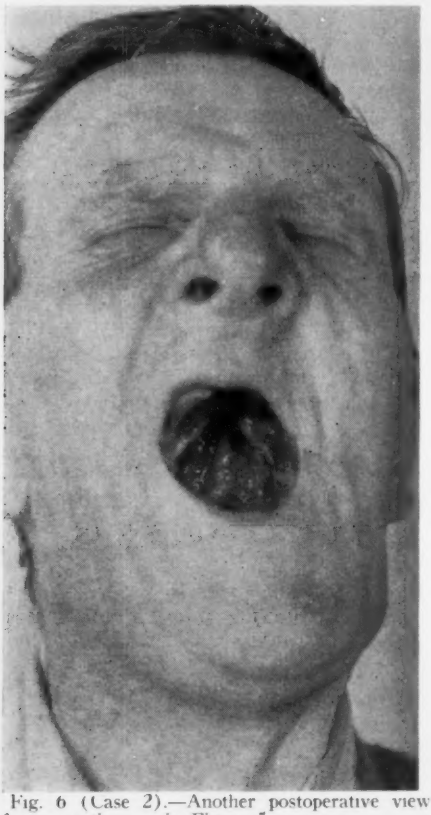


Fig. 6 (Case 2).—Another postoperative view of same patient as in Figure 5.

Dr. A. P. Prior, pathologist, reported on the tumor as follows: "Microscopically there is an epithelial tumor which infiltrated the tissue. The tumor is made up of glandular tissue with epithelial sprouting, epithelial formations with cystic spaces, mucinous tissue and some cartilage. The tumor has the character of a mixed cell tumor of salivary gland. Certain features suggest that local recurrence at least is to be expected."

After consultation with Dr. J. F. Bromley, radiotherapist, the area of residual tumor, which

Fig. 7 (Case 2).—Radiograph showing the radon seeds in the nasopharyngeal tumor remains.

enlarged postoperatively and was estimated as measuring approximately 2×1.5×1.5 cm. three months after operation, was treated with radon implants, 4000 r at 0.5 cm.; this caused the neoplastic nodule to subside.

Six months after operation the patient developed a suppurating sinus externally where the mandible had been divided; this proceeded to heal after the extrusion of a tiny sequestrum.

Nine months after the operation there was an edematous area just under the nasopharyngeal opening of the Eustachian tube; it subsided in two months. Eighteen months postoperatively no tumor was detectable clinically.

Comment on Case 2.—The external carotid artery was not ligated as a first step in the operation because (*a*) it was thought that bleeding could be controlled without

Fig. 8 (Case 2).—Another x-ray of same patient as in Figure 7 showing radon seeds in the nasopharyngeal tumor remains.

this, (*b*) it was felt desirable to maintain as good a local blood supply as possible in this arteriosclerotic, elderly man with a view to ensuring better healing and in case postoperative radiotherapy was required. Some of the operative steps would probably have been safer—especially about the Eustachian tube region—if the internal carotid artery had been exposed in the neck and isolated from the operation field up to the base of the skull. There was no call—and there is still none—for block dissection of the neck in this patient. In general I have found malignant sialomas of but limited radiosensitivity. They are perhaps somewhat more radiosensitive if in the nasopharynx than in other situations, but even there permanent cure is not usually to be expected from such treatment.

General Comment

Surgical Approaches.—Raven (1952) has described removal of a carcinoma involving the tonsil, fauces, soft palate, and base of the tongue by an external pharyngotomy following block dissection of the neck; the oral part of the operation was done with diathermy while the internal carotid artery and adjacent nerves were held aside in the neck; primary repair of the pharynx succeeded. Raven comments that in such a case local diathermy coagulation is not usually thorough enough, especially as the surgeon fears damaging the internal carotid artery.

Patterson (1937) devised a method for diathermy excision of carcinoma of the buccal aspect of the cheek in which the skin was protected from the diathermy by its preliminary temporary elevation. In some cases he also removed some bone from the upper and lower jaws.

An approach to the nasopharynx through the ascending ramus of the mandible has been described by Kremen (1953).

Gardham (1955), discussing the surgery of the upper jaw for malignant neoplasia, comments that a more adequate posterior margin of removal requires removal of the ascending ramus of the mandible together with the pterygoid muscles and plates.

In malignant neoplasms of the jaw, care is necessary to make the excision sufficiently extensive, especially posteriorly; the lymphatic drainage goes backwards, and it is just posterior to the area excised that recurrences are most frequent (also Gardham, 1943).

The advantages and detailed technique of temporary horizontal splitting of the cheek for exposing growths far back on the side of the tongue or on the posterior part of either alveolus are well described by Gardham (1943).

Orocutaneous or Pharyngocutaneous Fistula.—Trotter's essential purpose in suturing mucosa to skin in his lateral pharyngotomy operation was to prevent sepsis (Gardham, 1943). The antibiotics and sulfonamides have reduced this indication for the deliberate making of such a fistula, but the observations here reported suggest another important reason for not forsaking this point in Trotter's technique, namely, drainage of saliva that cannot, temporarily, be swallowed adequately, and that may therefore spill over into the larynx. I have not, so far, found continuous suction methods through the mouth or nose satisfactory for the removal of saliva in these cases.

The Tracheotomy.—The experience of Case 1 and of other cases suggests that the postoperative tracheobronchitis may be less in a tracheotomy without tube, i. e., in which the trachea is sutured to the skin, making a stoma through which suction can easily be carried out.

Instead of the usual tracheotomy tube, an endotracheal tube with an inflatable cuff may have advantages. It is necessary to deflate the cuff occasionally to prevent mucosal necrosis; however, suction at such times may prevent excessive aspiration of the fluid collected above the cuff. A size 6 endotracheal tube fits snugly in a tracheal stoma made with the larger punch of the Haslinger-Vienna pattern tracheotome.

Gastrostomy Feeding.—It is of course essential to nourish these patients adequately pre- and postoperatively—to maintain their calorie, protein, vitamin, and mineral requirements. I would draw attention to a few

points that may be useful to others faced with having to feed a patient for long through a gastrostomy. Complan, prepared by Messrs. Glaxo, is probably the best basic formula for the feeds in these cases; it contains adequate protein, fat, and carbohydrate plus a wide mineral and vitamin complex, consisting of a blend of dried skimmed milk, peanut oil, calcium caseinate, maltodextrin, cane sugar, potassium dihydrogen phosphate, sodium chloride, saccharated ferrous carbonate, vitamin C, manganese carbonate, nicotinic acid, vitamin E, copper carbonate, vitamin K, calcium pantothenate, vitamin B_1, vitamin A, pyridoxine, sodium molybdate, cobalt oxide, vitamins D and B_{12}. The peanut oil emulsion Prosparol, prepared by Duncan, Flockhart & Co., added to the feeds, increases their calorie value very satisfactorily. Complan and Prosparol can also be taken orally before or after gastrostomy feeding is instituted or stopped to help boost up the diet simply and effectively; vitamin P may help to prevent the purpura from which some elderly subjects suffer (Hunt, 1956), but the best remedy to correct the nutrition of these cases is resumption of eating. These elderly patients are likely to have arteriosclerotic, inefficient kidneys, and for this and other reasons may find it difficult to achieve homeostasis; hence the great help to be derived from frequent urine and blood examinations and from guidance with nutrition from an expert clinical biochemist.

Gardham (1953) also stresses the value of tracheotomy and gastrostomy in this type of case.

The Treatment of Malignant Neoplasia of the Tonsil.—In the two cases described above the tonsil involved by the neoplasm was also removed. Raven (1952) has described removal of a carcinoma of the tonsil, fauces, soft palate, and base of the tongue through an extensive external pharyngotomy with repair of the pharynx in a case unsuitable for radiotherapy.

It should not be assumed, however, that surgery is generally advisable for malignant lesions confined to the tonsil or its immediate environs. Literature on the treatment of malignant neoplasia of the tonsil has been reviewed by Stevenson (1949). Some authors advocate diathermy excision; the majority consider radiotherapy the treatment of choice (also Martin and Sugarbaker, 1941). Personal experience of 15 cases leads me to the following views. Large, proliferating carcinomas, lymphosarcomas and reticulosarcomas of the tonsil respond readily to radiotherapy. The relatively small, hard, ulcerated, and deeply infiltrating type of epithelioma of the tonsil, especially if it invades also the root of the tongue, does not respond well to radiotherapy and is probably treated better by the type of operation described by Raven (1952), in some cases part of the mandible also being removed to facilitate extensive excision. (Woodman, 1945, comments that extension of epithelioma of the tonsil into the sulcus between the tonsil and the tongue is extremely dangerous.) Lymphosarcoma of the tonsil is sometimes cured by diathermy excision. There is probably wide agreement with the statement that the local lesion in lymphosarcoma of the tonsil responds readily to radiotherapy, but that the patient usually succumbs eventually to lymphosarcoma elsewhere, especially in the liver and spleen. It is a moot question, however, soluble by statistical analysis of larger series of cases than are likely to be seen by any one worker, whether such dissemination is equally common in such cases not submitted to biopsy. Lymphoepithelioma, lymphosarcoma and epithelioma of the tonsil, no matter how treated, may cause metastases in the liver, elsewhere in the abdomen, and in the cranium. Colledge (1943) considered that biopsy, whereas relatively innocuous in intrinsic laryngeal carcinoma and in nasopharyngeal neoplasms, spreads neoplasia of the pharynx. I now prefer to postpone biopsy of a malignant tonsillar or pharyngeal neoplasm until radiotherapy has actually started. Surgery of malignant neoplasms of the tonsil is advocated only after failure of radiotherapy, in lesions extending much beyond the tonsil, or in the deeply infiltrating type of lesion mentioned above. Reenlarge-

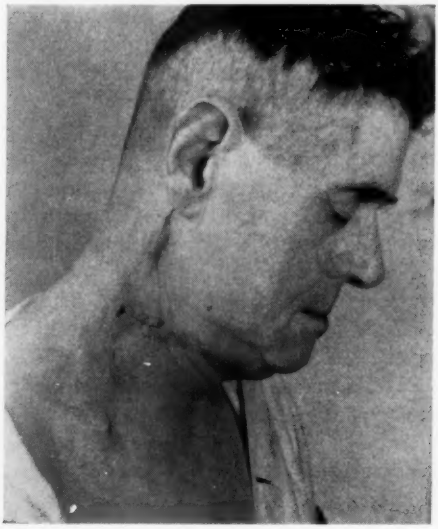


Fig. 9.—Photograph of a 79-year-old patient 12 days after block dissection of the neck after deep x-rays for a tonsillar carcinoma.

ment or enlargement of cervical lymph glands following the radiotherapy calls for block dissection of the neck. To ensure sound healing in this operation after radiotherapy, I prefer to preserve the platysma and to place the incisions so as to avoid having one unduly large flap that might slough (e. g., Fig. 9). A large transverse incision in a neck crease 2 fingerbreadths below the angle of the mandible with a more or less vertical downward extension from its center is also suitable, but a transverse incision higher than that results in unnecessarily unsightly depression of the wound. I have sometimes found it advantageous—especially in those suffering from venous congestion through myocardial impairment such as is common in the elderly—to commence the dissection from above, before ligating and dividing the internal jugular vein inferiorly. Whether or not to divide or resect also the posterior belly of the digastric and the stylohyoid muscle depends on the case; in some patients sufficiently high exposure cannot be obtained without doing so. In my cases attempting to preserve the spinal accessory nerve would have resulted in inadequate clearance; in one case the hypoglossal nerve had to be sacrificed, as part of it was involved in the mass of growth. Very rarely adequate removal may require resection of carotid arteries, especially at the bifurcation; the cerebral circulation may then be saved by (*a*) a venous graft or an arterial prosthesis from the remains of the common to the internal carotid artery, or (*b*) anastomosing the remains of the internal and external carotid arteries. Further experience of these procedures is required to determine which is best.

The main conclusion reached from surveying my cases is that the principal factor in the outcome is the malignancy of the growth and/or the resistance of the patient to it. My cases suggest that a greatly increased blood sedimentation rate indicates widespread dissemination and a poor prognosis.

Involvement of the Soft Palate and Uvula and Metastases.—Maguda and Bowers (1956) found cervical lymph node metastases in four of seven cases of primary carcinoma of the uvula. Martin (1942) suggests that the high incidence of metastasis of soft palate carcinoma is due to the mobility of this structure. In four cases of carcinoma of the hard palate I have observed for five years or longer, no metastases were detected. In one case of primary carcinoma of the uvula (following on leukoplakia of this structure, in a man whose son suffers from leukoplakia of the vocal cords)—confirmed histologically—and in another case of epithelioma of the soft palate—confirmed by biopsy some days prior to treatment—I found cervical gland metastases some weeks and two years after cure of the primary lesion by diathermy excision and radiotherapy, respectively. It is therefore suggested that particularly careful watch for metastases be observed when mobile structures such as the uvula, soft palate, and/or pharyngeal arches are involved in malignant neoplasia.

Preoperative Radiotherapy; "Immunity" to Malignant Disease.—In the treatment of carcinoma of the paranasal sinuses, the best results hitherto are probably obtained by preoperative radiotherapy followed by dia-

thermy excision. Whether, in the treatment of lesions such as those considered in this paper, preoperative radiotherapy would lead to better results remains to be determined. It is likely that some bad results from whatever method are due to low "immunity" of the patient to malignant neoplasia (also Black et al., 1956; others). Probably in many patients with a malignant tumor, cells from this embolize fairly frequently—perhaps especially so if it be in a part subject to much movement or trauma—and are rendered harmless by the body's defenses until these are overcome, these chemical defenses varying in degree in different subjects.

Conclusions

1. Resection of the ascending ramus of the mandible facilitates clearing out the pterygoid fossa and access to the nasopharynx in the surgery of neoplasms involving these areas.

2. Patterson's operation for carcinoma inside the cheek can be combined advantageously with the above procedure, and with more extensive jaw resections for large malignant growths.

3. Surgery—especially with diathermy—of malignant neoplasms of the upper pharynx is facilitated by isolation of the internal carotid artery and associated vital structures in the neck up to the base of the skull and retracting them out of the way or otherwise protecting them while diathermy is being used.

4. In operations that interfere temporarily with swallowing, provision of an oro- or pharyngocutaneous fistula for drainage of saliva reduces spill-over of this into the larynx. Tracheotomy to facilitate tracheobronchial suction also helps with the treatment and prevention of pulmonary complications in such cases; temporary gastrostomy is also advisable.

5. Alternatively, an opening in the pharynx that cannot be sutured can be securely closed, if desired, with sternomastoid muscle.

6. The improved access for intraoral surgery obtainable by temporary splitting of the cheek, horizontally, from the angle of the mouth is worth bearing in mind.

7. Malignant neoplasms confined to the tonsil and its immediate environs are usually treated better by radiotherapy than by surgery, surgery of the primary growth being employed in the event of failure of the radiotherapy. Surgery may be preferable in the relatively small, hard, deeply infiltrating type of epithelioma of the tonsil, especially if it involves also the tongue.

8. Metastases should be watched for particularly carefully when mobile structures such as the uvula, soft palate, and/or pharyngeal arches are involved by malignant neoplasia.

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Repair of the Facial Nerve in Traumatic Facial Palsies

Intracranial Nerve Grafting According to the Method of Norman M. Dott

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Recently the problem of dealing with intracranial lesions of the facial nerve has been solved by Norman M. Dott, Professor of Neurosurgery at the University of Edingburgh.

The idea of the operation is to by-pass the temporal bone, when that is necessary. Dott's description of the operation (Fig. 1) is as follows *:

The method is quite simple. The facial nerve is exposed in the cerebello-pontile angle by a unilateral cerebellar approach. There it is severed, and to the proximal stump a nerve graft some 15 cm. long is sutured. The graft is brought out through the craniotomy opening. A tunnel for the graft is made beneath the mastoid process in the plane between the sternomastoid muscle superficially and the splenius capitis deeply, extending forward to the vicinity of the posterior surface of the parotid gland. The distal end of graft is marked by clamping a silver clip across it, and it is thrust forward through the tunnel, some slack being coiled up at the distal end in the neighbourhood of the parotid gland. Ninety days are now allowed—the period calculated for nerve fibres to have traversed the length of the graft and to have arrived at its distal end. The parotid region is now exposed, and assisted by preliminary x-rays of the silver clip that object is found and the distal few centimetres of the graft is gently unravelled. The facial nerve is now exposed at the stylomastoid foramen and cut there, leaving the distal stump protruding some 10 millimetres from the posterior surface of the parotid gland. The graft is now brought to this stump. As much as convenient—usually several centimetres—of the

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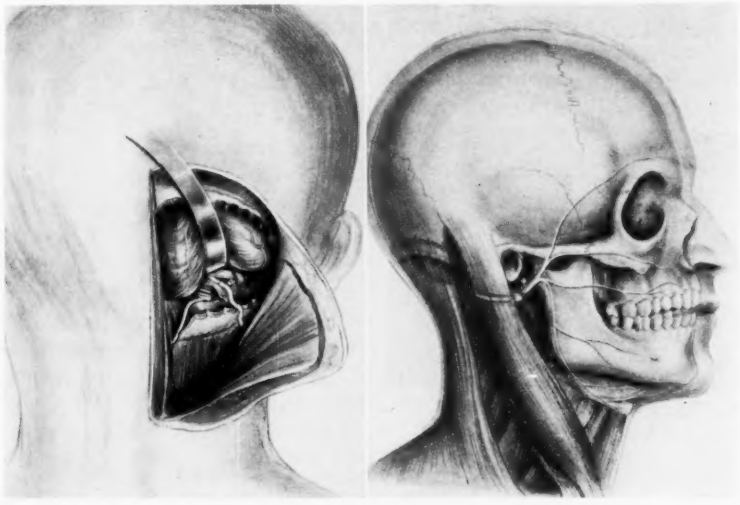
* Permission has been given by Professor Dott to describe his method and use his pictures.

Fig. 1.—Norman M. Dott's intracranial "by-passing" grafting of the facial nerve. (By courtesy of Normal M. Dott.)

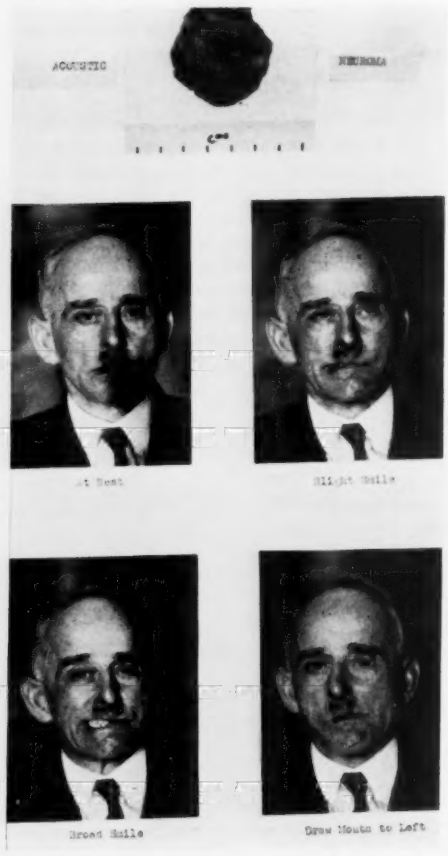


distal end of the graft is removed. The second nerve suture is now completed between the distal end of the graft and the distal part of the facial nerve beyond the stylomastoid foramen. The entire intrapetrous section of the facial nerve is thus by-passed by the graft which runs behind and below the petrous bone.

As a graft Dott uses the sural cutaneous nerve from the back of the calf, which is convenient in providing a length of 15 or 20 cm. without branches.

Dott has operated upon four patients. In one case the palsy was due to an acoustic neuroma; in two cases the patients had sustained a unilateral gunshot injury of the mastoid region resulting in extensive comminuted fracture, facial paralysis, and deafness. Extensive mastoid operations secured healing of infective complications. The prospects of finding and reconstituting the facial nerve after this extensive disorganization were, according to Dott, obviously poor, and intracranial nerve grafting was carried out 7 and 12 months respectively after injury.

Fig. 2.—Facial palsy due to removal of an acoustic neuroma. Dott has performed his intracranial "by-passing" grafting. Pictures taken one year 10 months after first suture, one year 8 months after second suture. (By courtesy of Norman M. Dott.)



In the last case a crush fracture of the skull resulted in exactly the same complications as described above. Here grafting was performed 11 months after injury.

In two of the patients an 80% recovery was obtained (Fig. 2), in the other two 50% recovery.

To me Dott's operation is one of the greatest advances in facial nerve surgery since Bunnell and Ballance and Duel published their papers.

Dott's operation has made it possible to restore mimicry to patients beyond the limits of an intratemporal repair of the nerve.

Dott asks the question whether his operation should be the preferred method for all intrapetrous lesions that fail to recover spontaneously or whether it should be reserved for cases unsuitable for the Ballance-Duel intrapetrous graft.

From my point of view the results of intrapetrous grafting, based upon a vast clinical experience, are so good that this method should be used whenever possible. If, however, the lesion of the nerve is situated proximal to the geniculate ganglion or if the temporal bone for one reason or other is destroyed, the Dott by-passing-grafting is the answer to a proper treatment, much superior to anastomosis operations because, by repairing the facial nerve and reconnecting it with the brain, mimicry can be restored.

A Simple and Reliable Tuning-Fork Test for Recruitment

JAMES R. CHANDLER, M.D., Miami, Fla.

There are perhaps a dozen different tests for recruitment, at least four of which are in relatively common use, and all of which require the use of an audiometer or more complicated apparatus.[1,2] However, for at least four years, I have been using what has been for me a very simple and reliable test for recruitment. It can be used in all instances in which one ear is normal or near normal, and requires only 30 to 45 seconds to perform the entire test. In all cases subsequently studied by the alternate loudness balancing test,[3] a positive result was confirmed. On a few occasions, in patients in whom I did not feel recruitment existed it was by more accurate testing found to be present to a very slight degree. However, the reverse has not yet been noted.

The test is a rough one and necessarily qualitative, and thus does not lend itself to statistical analysis; however, it has proved its value over a period of several years, and, because of its simplicity, is felt to be of value in the clinical evaluation of the unilaterally deafened patient. It is offered in this spirit and not as a substitute for those tests in wide use now.

The standard tuning forks of either steel, aluminum, or magnesium alloy are used. I have most commonly used the latter. When struck forcibly against the heel of the shoe or some other hard object without regard to the distortion or overtones produced, they will yield an intensity of more than 100 db. for several seconds. (By actual measurement, 110, 105, and 108 db. re 0.0002 dynes/cm.^{2} for the 512, 1024, and 2048 cps forks respectively. These are the total sound pressures produced, as measured by an H. H. Scott Sound Level Meter, Model 410-A).

The test itself is performed as follows: Any of these three forks is struck so as to produce a threshold or near-threshold sound in the ear in question. The two ears are then compared by presenting the fork immediately to the other and better ear. The sound is heard much louder in the better ear. The fork is then maximally activated as described above and immediately presented to each ear in quick succession. This procedure is then repeated, using the other two forks.

The patient who recruits will report equal or near-equal loudness in each ear and very commonly reports that the sound is louder in the diseased ear. A very common observation has been the obvious discomfort produced by the maximally activated fork upon its presentation to the diseased ear and the resultant shying away by the patient. This in itself provides the "tipoff" as to what the answer will be when the patient is asked, "In which ear is it louder, now?" Of course, the patient with a nonrecruiting perceptive deafness or one with a conductive deafness continues to report that the sound is heard much louder in the normal ear.

Summary

A very simple test for recruitment is herein presented. This has not been de-

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scribed previously. The only necessary equipment is one or several standard tuning forks. It is limited in application to those patients with unilateral deafness, but requires less than one minute of the clinician's time. It should be confirmed by more accurate and elaborate tests.

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The Sampling Problem in a Hearing Survey

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The stated purpose of any hearing survey is the collection of a random sampling of the hearing acuity of a specific population. However, it is apparent from the results of previous hearing surveys that there appears to be a sampling bias. Glorig and Wheeler [1] state that those individuals who do take advantage of such testing may be persons who suspect a hearing difficulty. This would tend to weight the test results in the direction of impaired hearing. The results of a hearing survey conducted at county fairs in the State of Ohio [2] appeared to indicate that such was the case.

As a result of such previous difficulties, the Ohio Department of Health became interested in the development of a possible approach that might insure a random sampling of the hearing acuity of the adult population of Ohio. It was decided to set up a "pilot" program at one of the county fairs being conducted during the summer of 1955. The Lake County Fair, which was held at the Painesville, Ohio, fairgrounds was selected as the site of the trial program. The tests were to be administered in a sound-treated, mobile trailer which contained two testing rooms. A sampling method similar to that employed at the Milwaukee County Fair was utilized. Every 10th person entering the fairgrounds was to be given a pass which would enable him to have his hearing tested. The pass was actually a small brochure which contained information relative to the nature of the test, i. e., length of test, location of testing area, and age limitation (14 to 65 years only). Each brochure was successively numbered to assist in the tabulation of the number of passes dispensed and returned. Prior to the opening of the Lake County Fair, publicity releases describing the purpose of the survey as well as the testing procedure were distributed to area newspapers and radio stations. As a result, the survey received extensive publicity coverage.

One thousand two-hundred seventy-six brochures were distributed. Only 224 of the brochures were presented at the testing trailer. Thus, only 1.7% of the persons receiving passes reported for a hearing test. Of this group 86 were female and 138 were male. In terms of hearing loss 65 of the subjects, or 29%, exhibited an average loss of hearing greater than 15 db. through the speech range (500-4000 cps) for one or both ears. This percentage of hearing loss far exceeds the quoted 1% to 3% incidence of hearing loss found in the adult population.[3-5] If the distribution of subjects, in terms of age, is examined (see Table) it is evident that the sample has its greatest concentration in the 35-39-year range. If an equi-probable distribution is assumed for each age range, 20 to 22 subjects should appear in each category. However, as is evident, the distribution in the 20-24- and 65-69-year categories is considerably below this figure, while the distribution in the

Distribution of Subjects by Age

Age Range, Yr.	No. of Subjects	Lake County Population
14-19	22	5,077
20-24	6	5,476
25-29	21	7,326
30-34	27	7,547
35-39	40	7,004
40-44	29	5,900
45-49	24	4,949
50-54	14	4,440
55-59	23	3,897
60-64	13	3,124
65-69	5	2,521
Total	224	57,261

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aforementioned 35-39-year range and the 40-44-year range exceeds such a distribution. Thus, in terms of equi-probable distribution of age, the present sampling is not a representative sample. Also, in terms of an even distribution of male and female subjects the distribution is heavily skewed toward male representation. A statistical comparison, in terms of the actual Lake County population-age distribution indicated that the present sample was not representative of the county as far as age distribution was concerned. This was accomplished through comparison of the test sample with the population distribution indicated in Column 3 of the Table. The resulting chi-square 29.72; d. f. 11 was significant at the 1% level of confidence, indicating that there was no random distribution with respect to the population attending the fair.

However, the ideal type of sample should not be based solely on such concepts of population distribution but should also take into consideration other vital statistics of a particular city, county, or state, i. e., distribution by sex, occupation, socioeconomic position, etc.

The results of the present survey, along with the results of the Milwaukee Fair survey would appear to indicate that the particular type of sampling technique employed in both of the studies is not too workable in terms of the obtaining of random representation of the hearing acuity of a selected population.

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Effect of Acute and Prolonged Oxgen Deprivation on the Organ of Corti in Guinea Pigs and Cats

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According to numerous studies the cochlear microphonic response appears to arise in the sensory cells of the organ of Corti (Guttman and Barrera; Neff, Wever, and Neff; Juul and Vraa-Jensen; Rüedi et al.; Larsell et al., and Békésy). If the hair cells are destroyed, the microphonic response disappears, and, if their vitality is reduced, e. g., by severe oxygen deprivation, the microphonic response is diminished. If the oxygen deprivation is carried very far, or if the animal is exposed to repeated experiments of oxygen deprivation, the microphonic response will become lowered to one-fifth of the original magnitude. If the animal is again supplied with a normal amount of oxygen, the microphonic response does not return to the initial value during the few hours that such experiments are continued (Lawrence and Wever; Gisselsson). There is no doubt that the severe anoxia has given rise to severe changes in the acoustic organ.

It was reasonable to investigate whether such changes were demonstrable by ordinary histological examination of the organ of Corti, the spiral ganglion, and the acoustic nerve. So far, only Lawrence and Wever have performed studies of this nature. They used cats, which were exposed for 10 minutes to an air mixture containing only 0.5% oxygen. The cochlear potentials dropped by 10 db. After the experiments had been repeated three times, the cochlear potentials had dropped by 20 db. After the last experiment, the animals were killed and the cochlear examined histologically. The severest changes were found in the basal turn and most pronounced in animals exposed to severest lack of oxygen. Mainly the supporting cells in the organ of Corti were severely affected. The Deiters and Hensen cells had disintegrated, the external sulcus cells had swollen, and the basal part of the hair cells shriveled up. In severer cases, the hair cells were also undergoing dissolution, and the stria vascularis was affected, the cells being divided by fibroid strings which had given off a hyaline exudate demonstrable in the endolymph.

These results are remarkable in two respects. In the first place, it is strange to encounter such massive changes in a sensory organ whose function is, according to van Liere, the last to cease in progressive anoxia. In the second place, it is peculiar that the supporting cells should be affected before the sensory cells and that the nervous tissue, the least resistant of all tissues to oxygen deficiency, does not seem to be affected at all.

For these reasons we decided to repeat the experiments.

Present Investigations

Our experimental animals were guinea pigs and cats. All were healthy and showed a positive Preyer's reflex when the experiments were started. The guinea pigs were exposed to both acute and prolonged oxygen deprivation, whereas the cats were exposed only to prolonged oxygen deprivation.

The experiments of acute oxygen deprivation were carried out as follows: After the animals had been anesthetized by intraperitoneal injection of urethan, they were tracheotomized. Oxygen

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deprivation was effected by clamping the trachea by soft forceps for 60-150 seconds. The experiments were repeated three times at intervals of about five minutes. As a rule, the anoxia was so severe that the animals did not breathe spontaneously at the end of the experiments. Often artificial respiration had to be performed for one-half to one minute to get the respiration going again.

Seven guinea pigs were subjected to acute anoxia. In the first three the cochlear potentials were recorded during the experiment. Five minutes after the experiment was concluded the animals were subjected to intravital fixation in Wittmaack's fluid after the circulation was washed with 38 C isotonic saline solution for two minutes. The temporal bones were embedded in celloidin and cut into serial sections, which were stained partly with hematoxylin-eosin and partly by the method of Mallory.

In the experiments with prolonged oxygen deprivation the nonanesthetized animals were placed in a glass container (5.8 liters) with a closely fitting lid; 2% oxygen and 98% nitrous oxide were administered from an anesthetic apparatus through a glass tube with a flow of about 5 liters per minute. The animals remained for an average of 56 minutes in this air mixture, and the experiments were repeated three times at intervals of a few days. Two or three days after the last experiment the animals were fixed intravitally under urethan anesthesia.

This series comprises 13 guinea pigs, 6 of which, however, died during the experiments. Out of the remaining seven, one could not carry through the experiment with 2% oxygen, but was at times given 3%-4%.

Four cats were subjected to the prolonged experiments. The first one breathed nitrogen "contaminated" with 0.5% oxygen. Three times in the course of the experiment the cat stopped breathing and developed pareses. After artificial respiration in pure oxygen for a few minutes, the respiration was reestablished. Half an hour after the experiment was concluded the animal was anesthetized with urethan and fixed intravitally.

Cat No. 3 was kept for 34 minutes in a mixture of 2% oxygen and 98% nitrogen. At the end of this period the spontaneous respiration had stopped, but it was reestablished by artificial respiration in pure oxygen. Half an hour later intravital fixation was done under urethan anesthesia. Cats Nos. 2 and 4 died after 22 and 5 minutes, respectively, in the air mixture of 2% oxygen and 98% nitrogen. The labyrinths of these two cats were not examined histologically.

Results

As is apparent from Table 1, histological examination of the seven guinea pigs exposed to acute oxygen deprivation did not reveal any abnormality. The cochlear duct, with the organ of Corti, stria vascularis, external and internal sulcus cells, and Reissner's membrane, were of normal appearance (Figs. 1 and 2). The same applies to the spiral ganglion and the cochlear nerve. In two cases the brain was examined and showed signs of acute, but perhaps reversible, degeneration of the ganglion cells. The ganglion cells of the cortex and Purkinje's cells in the cerebellum were the seat of some swelling and chromophobia or chromatolysis. The nuclei, too, were somewhat swollen. There was no abnormality of the basal ganglia. This was also true of the pons and medulla oblongata, and nowhere was there any sign of degeneration of the medullary sheath or hemorrhages.

TABLE 1.—*Acute Oxygen Deprivation—Guinea Pigs* *

No.	Histological Changes		Reduction of Cochlear Potential
	Cochlea	Brain	
1	None		+
2	None		+
3	None		+
4	None		
5	None		
6	None	Acute degeneration of ganglion cells	
7	None	Acute degeneration of ganglion cells	

* Weight 300—500 gm.; urethane (intraperitoneally); tracheotomy, clamping off the trachea 3 times for 60-150 seconds at 5-10 minutes intervals. Intravital fixation in Wittmaack's fluid 5 minutes after the last experiment.

In three cases the microphonic response of the cochlea was recorded during the oxygen deprivation. In all cases the anoxia was found to give rise to a permanent impairment of the microphonic response of the cochlea. In other words, the cochlear potentials showed no signs of increasing in magnitude after the last period of anoxia, despite administration of pure oxygen after spontaneous respiration had been reestablished by artificial respiration (Fig. 3).

Table 2 gives the results of experiments with prolonged oxygen deprivation in guinea pigs. Within this group, 14 labyrinths were examined histologically and all were normal.

In two instances the brain was examined and proved to be normal, without any signs

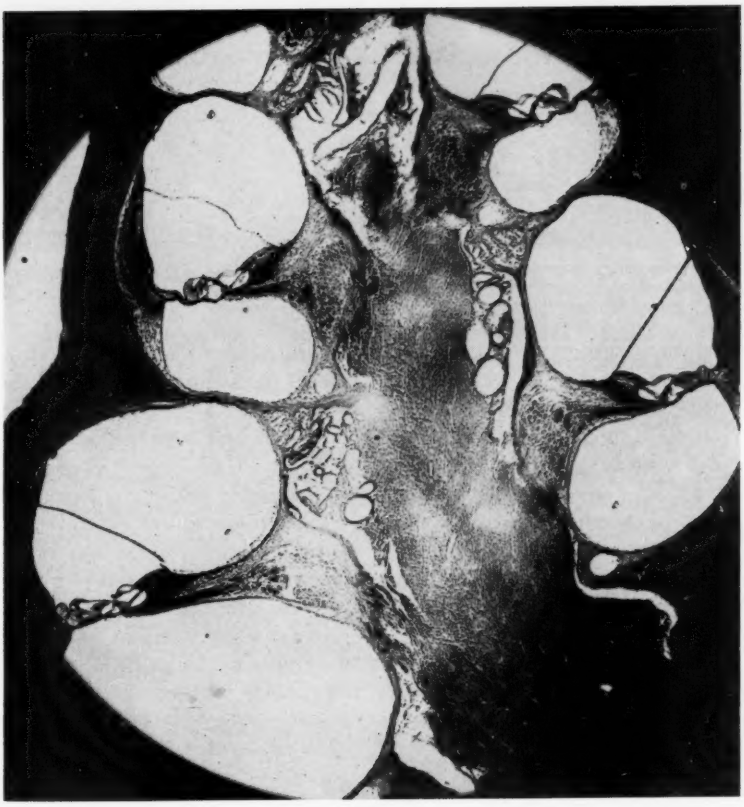

Figure 1

Figure 2

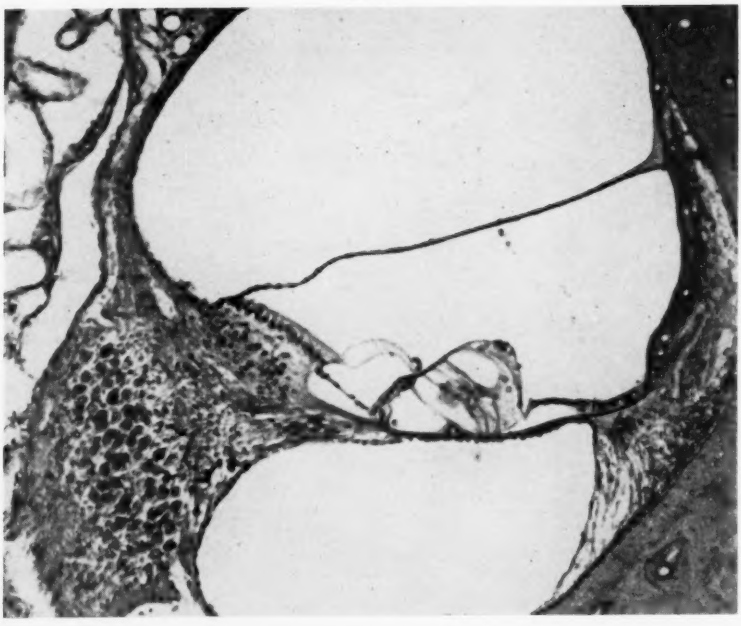

Fig. 3.—Cochlear potentials before (*A*) and after (*B*) the guinea pig was exposed to oxygen deprivation. Sound frequency 800 cps. The potentials in the bottom line are from a piezoelectric-control microphone.

of degeneration of ganglion cells or white matter.

In the experiments with prolonged oxygen deprivation in cats, two out of the four experimental animals died of anoxia. The other two did not present any abnormality upon histological examination of the cochlea (Fig. 4). Examination of the brain of cat No. 1, which had for 69 minutes been breathing nitrogen "contaminated" with 0.5% oxygen, showed signs of Nissl's "primäre Reizung," the ganglion cells of the cerebral cortex and Purkinje's cells showing some swelling and chromophobia with slight blurring of the nuclear structure. The white matter did not display any abnormality, and the ganglion cells of the basal ganglia and medulla oblongata were normal.

In cat No. 3, which had been breathing a mixture of 2% oxygen and 98% nitrogen for 34 minutes, histological examination of the brain did not show any definite abnormalities.

The clinical condition of all the animals exposed to prolonged oxygen deprivation was recorded during the experiment. Table 4 gives three typical examples.

At the beginning of the experiment, the respiratory rate was 100-140, but after two to three minutes in 2% oxygen and 98% nitrogen it had fallen to 50-75. The animals were now in a state of deep anesthesia. If the anoxia was continued, they developed convulsions and stopped breathing. This necessitated artificial respiration and administration of more oxygen.

Preyer's reflex was not lost until the animal was in deep anesthesia and after the corneal reflex had disappeared. As soon as the animal was again given oxygen,

TABLE 2.—*Prolonged Oxygen Deprivation—Guinea Pigs* *

No.	Air Mixture	Date of Experiment	Duration of Oxygen Deprivation, Min.	Intravital Fixation	Complications	Histological Changes	
						Cochlea	Brain
1	$N_2O + 2\% O_2$	13/9/55	50	23/9			
		14/9	26			None	
		20/9	27				
2	$N_2O + 2\% O_2$	13/9			Death		
3	$N_2O + 2\% O_2$	13/9	41	23/9		None	
		14/9	24				
		20/9	9				
4	$N_2O + 2\% O_2$	13/9	27	23/9			
		14/9	36			None	
		20/9	32				
5	$N_2O + 2\% O_2$	13/9			Death		
6	$N_2O + 3\% O$	27/9	180	11/10			
	$N_2O + 4\% O$	30/9	116			None	
	$N_2O + 4\% O$	4/11	60				
7	$N_2O + 2\% O$	27/9			Death		
8	$N_2O + 2\% O$	27/9			Death		
9	$N_2 + 2\% O$	20/10	73				
	100% N_2	25/10	127				
	100% N_2	27/10	128				
10	$N_2O + 2\% O_2$	21/3/56	24				
		23/3	40	26/3			No abn.
		24/3	56				
11	$N_2O + 2\% O_2$	21/3	48				
		23/3	44	26/3			No abn.
		24/3	49				
12	$N_2O + 2\% O_2$	21/3			Death		
13	$N_2O + 2\% O_2$	21/3			Death		

* Weight 300-500 gm.

TABLE 3.—*Prolonged Oxygen Deprivation—Cats*

No.	Air Mixture	Date of Experiment	Duration of Oxygen Deprivation, Min.	Intravital Fixation	Complications	Histological Changes	
						Cochlea	Brain
1	N_2 + 0% O_2 + 3 times pure oxygen due to collapse	1/6	69	30 min. later	Pareses	None	Nissl's "primäre Reizung"
2	N_2 + 2% O_2	8/6	22		Death		
3	N_2 + 2% O_2	12/6	34	30 min. later	Pareses	None	No definite abnormality
4	N_2 + 2% O_2	9/6	5		Death		

Preyer's reflex reappeared, provided the cochlear potentials had not been impaired.

Comment

Our investigations did not confirm Lawrence and Wever's findings, as our histological examinations did not reveal any abnormality apart from slight changes of certain cerebral ganglion cells.

This might be imagined to be due to a less severe oxygen deprivation in our experiments, but this cannot be so, as in two of our experimental series half the animals succumbed to oxygen deficiency. The microphonic response of the cochlea was also impaired in the three examined cases, so that it must be assumed that our animals were exposed to the greatest possible oxygen deprivation. And during our prolonged experiments our animals were exposed to oxygen deprivation for a considerably longer period than Lawrence and Wever's.

In our first experiments we used guinea pigs, whereas Lawrence and Wever used

Figure 4

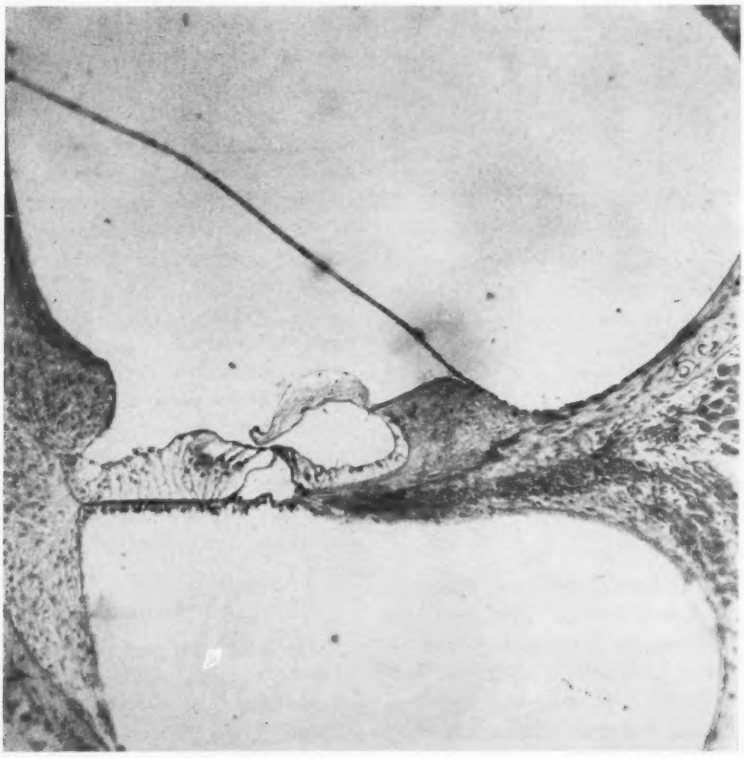

TABLE 4.—*Examples of Prolonged Oxygen Deprivation in Guinea Pigs, Repeated Three Times at Five-Minute Intervals*

Experiment	Time from Commencement of Experiment, Min.	Oxygen in Resp. Air, %	Preyer's Reflex	Resp. Rate	
I	0	2	+	120	
	3	2	+		Deep anesthesia
	3½	2	—	52	
	5	20	—		Art. resp.
	7	2	+	120	
	11	2	+		Deep anesthesia
	12	2	—	Irregular	
	14	20	—		Art. resp., convulsions
	20	2	—		Deep anesthesia
	21	4	—		
	24	4	+	108	
II	0	2	+	96	
	2	2	+		Anesthesia
	4	2	—	28	
	5	4	+	16	
	19	2	+		Deep anesthesia
	24	100	—		Convulsions
	31	2	+		
	34	2	(+) Faint		Deep anesthesia
	35	2	—	20	Convulsions
	35½	4	—		
	40	4	+		
III	0	2	+	140	
	2½	2	+		Anesthesia
	4	100	—	Resp. arrest	
	7	4	—	Irregular	
	11	20	+		
	14	4	+	160	
	30	2	+	120	
	33	2	(+) Faint	Irregular	
	34	4	—		Convulsions
	39	20	+		
	43	2	(+) Faint		Anesthesia
	44	2	—		
	46	4	—	20	Convulsions
	50	4	+	16	

cats. Since it could not be ruled out a priori that guinea pigs were more resistant than cats to oxygen deprivation, we also used cats, but in cats, too, we could not find any histological changes in the cochlea after oxygen deprivation.

From our experiments we must draw the conclusions that the sensory cells of the organ of Corti, examined by ordinary histological technique, do not exhibit any pathological changes, not even after severe, prolonged oxygen deprivation.

On the other hand, there is, in our opinion, nothing surprising in the fact that ordinary histological changes do not occur in the cochlea, although its ability to produce microphonic response has been impaired by lack of oxygen. These potentials require a large quantity of energy, which must be taken from the cochlea. The mechanical energy administered with the sound is not sufficient for this purpose. Békésy demonstrated that very probably this energy is taken from the potential difference of 50μv.-100μv. which exists between the endolymph and perilymph. The maintenance of this potential difference, which cannot be explained by the ion distribution between the endolymph and perilymph, demands great energy, for which oxygen is required. The fact is that this potential difference also decreases in animals exposed to oxygen deprivation and this decrease parallels the lowering of the magnitude of the cochlear potentials (Gisselsson, 1955). A condition for normal cochlear potentials is a normal course of probably several biochemical processes in the cochlea. In these processes oxygen plays an important role. In the presence of severe oxygen deficiency, the processes do not run a normal course, and an accumulation of chemical products results. This is also indicated by the findings of Tonndorff et al. that animals exposed to strong sound stimulation are considerably more sensitive to oxygen deficiency than animals not submitted to such stimulation. The disturbances of these chemical processes cannot be demonstrated by our usual histological methods, and this explains our negative results. Instead, one might use the cytochemical methods described by Hamberger et al. by which they could demonstrate, e. g., that acoustic stimulation induces "a decrease in the nucleoproteins of the nerve cells with a subsequent regeneration, the whole cycle of changes taking three weeks under the experimental conditions used." We did not have the possibility of using these methods or of employing the electron microscope in our studies.

Summary

After acute and prolonged oxygen deprivation 20 guinea pigs and after prolonged oxygen deprivation 4 cats showed no changes in the cochlear duct or spiral gan-

glion upon ordinary histological examination.

Mild acute degeneration of the ganglion cells was found in the brains of two guinea pigs suffering from acute oxygen deficiency. A cat showed signs of Nissl's "primäre Reizung" on examination of the cortical ganglion cells and Purkinje's cells in the cerebellum.

In three guinea pigs the cochlear potential, measured before, during, and after acute oxygen deprivation, proved to be permanently reduced.

Lasarettet Örebro (Dr. Gisselsson).
Kommunehospitalet (Dr. Falbe-Hansen).

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Case Reports

Nasal and Laryngeal Involvement in Abdominal Hodgkin's Disease

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Hodgkin's disease frequently involves the cervical lymph nodes and intrathoracic structures but rarely occurs in the nose and throat. A number of articles presenting series of several hundred cases have little or no mention of upper respiratory tract involvement. Deafness, epistaxis, and hoarseness are very infrequently presenting symptoms. A case with two of these unusual features seems worthy of presentation.

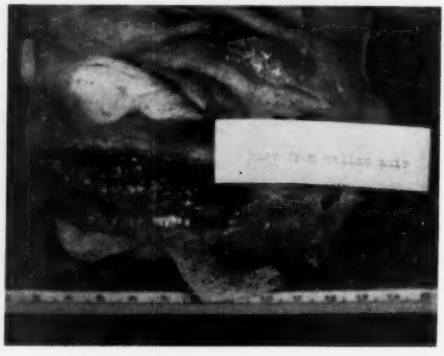
A 26-year-old man was seen in the office because of severe epistaxis. There had been intermittent mild bleeding for several days. Profuse bleeding from a polypoid mass in the right choana was controlled with an anterior pack. The patient's hearing was decreased markedly. He had noticed gradual loss for several weeks. About two weeks previously he had been acutely ill with fever, hoarseness, and cough. Antibiotic treatment by the family physician for a pneumonia of the left lung produced improvement, but the cough and hoarseness persisted. He was hospitalized for further examination and treatment.

The patient appeared acutely ill. His temperature was 99.2 F, pulse 120, and respiration 24. Impacted cerumen was removed without improving the hearing. Both drums had a slight dullness but normal landmarks. Packing was present in the nose. The mouth was normal. Mirror examination of the larynx revealed edema of the epiglottis, arytenoids, and true cords with moderate injection. No cervical adenopathy was palpable. Consolidation of the left lung was evidenced by dullness to percussion and decreased breath sounds. A few moist rales were present. The abdomen was soft, without palpable organs or masses.

The erythrocyte count was 2,560,000, hemoglobin 7.9 gm., and white cell count 3900 with a normal differential. A trace of albumin was present in the urine. Chest x-ray showed an infiltrative density of the left mid-lung field with some extension to the apex. The left hilar shadow was exaggerated. A central area of translucence indicated cavitation. The impression was a clearing pneumonia with abscess, but tuberculosis was considered.

Whole blood transfusions were given. Myringotomy did not liberate any fluid. Repeated microscopic examinations for tuberculosis were negative. The patient remained acutely ill despite heavy antibiotic treatment with penicillin, streptomycin, oxytetracycline (Terramycin) and erythromycin (Ilotycin). Nasal packing was removed without reoccurrence of bleeding. Nasal biopsy was deferred because of the patient's poor condition and the desire to avoid further loss of blood. A pale, fungating mass extending from the epiglottis to the right arytenoid developed and enlarged. Direct laryngoscopy with biopsy was performed. Microscopic examination showed chronic inflammatory granuloma. The febrile course continued with elevations to 103-104 F on many days. Left hydrothorax developed, and thoracentesis yielded amber-colored fluid. Subsequently catheter drainage was instituted. Repeated chest x-rays were essentially unchanged except for the hydrothorax. The liver and spleen enlarged and became

Fig. 1.—Mass from celiac axis.



Submitted for publication July 11, 1957.

Read before the Section on Laryngology, Otology and Rhinology at the 106th Annual Meeting of the American Medical Association, New York, June 5, 1957.

Fig. 2.—The larynx, showing mass involving the right anterior portion.

palpable. Edema of the face and extremities occurred. A steady downhill course continued, and the patient died six weeks after admission.

The original impression of tuberculosis was not supported, and a blood dyscrasia was not demonstrated. Laryngeal biopsy was nonspecific.

Figure 1, abdominal Hodgkin's tumor, taken at the postmortem examination, shows a marked involvement of the celiac axis and left suprarenal area.

Fig. 3.—Photomicrograph of the nasal mass.

Fig. 4.—Photomicrograph of the laryngeal mass.

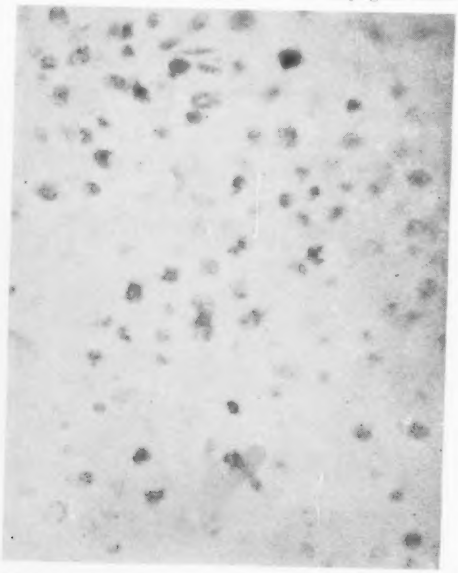


Fig. 5.—Photomicrograph of the abdominal primary tumor.

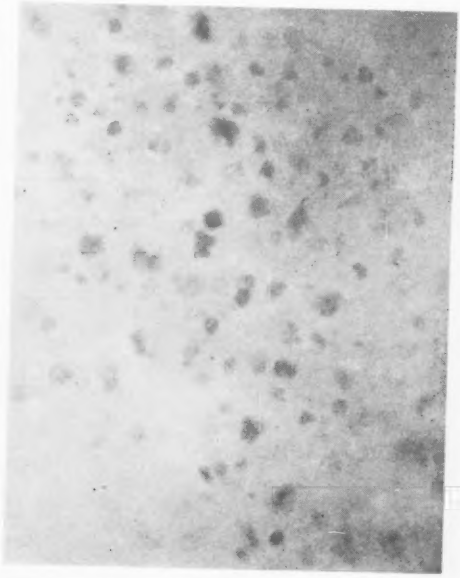


Figure 2, a photograph of the larynx, shows the epiglottis to be completely destroyed. A 1 by 2.5 cm. rough, granular mass is seen to involve the right anterior portion of the larynx. Cervical lymph nodes were not enlarged. The left lung showed marked consolidation, a large abscess, and multiple small abscesses. A culture of the lung grew Escherichia coli and Staphylococcus aureus. Photomicrograph of the nasal mass (Fig. 3), of the laryngeal mass (Fig. 4), and the abdominal primary tumor (Fig. 5) are similar—quite typical of Hodgkin's granuloma.

This rapidly fatal case of Hodgkin's disease with symptoms of acute respiratory infection demonstrates the difficulty in making the diagnosis, particularly when a biopsy can be interpreted only as chronic granuloma Such a nonspecific biopsy report should cause one to suspect Hodgkin's disease and attempt verification.

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Hypermobility of the Tongue

CAPT. MAURICE SCHIFF (MC), U. S. N.

Excessive mobility of the tongue was first brought to the attention of the medical world by Petit,[1] in 1742, when he described three cases of tongue swallowing in children, causing death of two of them by suffocation. This was due to the excessive length of the frenulum, which failed to exercise its due influence in fixing the forepart of the tongue. Fairbairn,[2] in 1845, reported a similar case of suffocation due to tongue swallowing. His description of the autopsy findings showed in detail the position of the obstructing hypermobile tongue. Henning[3] mentioned two cases of children dying of acute suffocation during a paroxysm of whooping cough, apparently due to the sucking of the tongue into the pharynx in the long act of inspiration between coughs. Butlin and Spencer,[4] in their volume on "Diseases of the Tongue," reviewed the literature up to the beginning of this century. During the past 20 years this condition has been reported rarely and was mentioned only briefly by Prinz and Greenbaum.[5] In the past there has been no photographic evidence of this medical oddity.

Submitted for publication May 13, 1957.

From the Otolaryngology Branch, Eye, Ear, Nose and Throat Service, U. S. Naval Hospital, Oakland, Calif.

The opinions or assertions contained herein are the private ones of the writer, and are not to be construed as official or reflecting the views of the Navy Department or the Naval Service at large.

Report of Case

The present observation was made on an asymptomatic patient who was having the routine ear, nose, and throat portion of his Navy physical examination. When asked to retract the tongue so that the floor of the mouth could be inspected (Fig. 1), he proceeded to roll the tongue back into the nasopharynx behind the soft palate (Fig. 2). The patient could perform this act at will as often as requested. With the tongue in this position, he could literally lick his nasopharynx. The tip of the tongue could be seen via the anterior nares through a nasal speculum after the nasal mucosa had been shrunk with a vasoconstrictor. In this position, the veins of the inferior surface of the tongue could be well visualized.

The following step-wise motions were observed in this order, with their associated muscles: The base of the tongue was drawn backward by a lowering of the hyoid bone and a contraction of the hypoglossus muscle. The tongue then flattened and broadened itself by the action of the verticalis linguae. At this same time it was shortened and the tip and sides turned upward by the action of the longitudinalis linguae superior and inferior muscles. At this point the tip of the tongue was behind the

Fig. 1.—Tongue in the normal position.

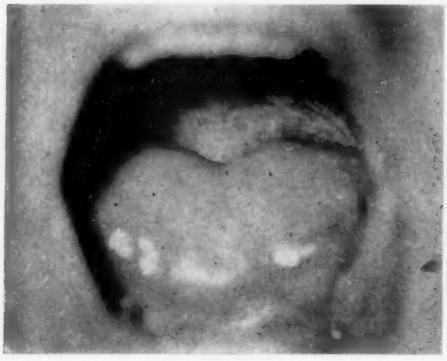

Fig. 2.—Tongue in the nasopharynx.

soft palate, and the patient selectively narrowed and elongated it by the use of the transversus linguae muscle. Owing to the peculiarity in this position, other tongue muscle actions were rendered ineffective, much as are the eye muscles when changed from the primary to the secondary positions.

Comment

This clinical curiosity is less frequently looked for or observed in recent years, as evidenced by the lack of even passing mention in most modern standard otolaryngologic texts. No treatment is necessary unless symptoms exist, at which time surgical intervention has been recommended for correction of the hypermobile tongue.

Summary

The mechanism and muscular action of the hypermobile tongue are discussed and illustrated with photographic evidence. When symptoms exist, surgical intervention may be used for correction of this abnormality.

U. S. Naval Hospital, Oakland 14, Calif.

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Benign Fibroma of the Tonsil

Report of One Case

COL. BYRON G. McKIBBEN (MC); CAPT. MILOS S. BOZANIC (MC), and CAPT. CLIMACO FLOREZ (MC), U. S. Army

Fibroma of the tonsil is rare. In 1931, New and Childrey [1] reported 63 cases of benign tumors of the tonsil and pharynx which were observed at the Mayo Clinic from 1917 to 1930 inclusive. There was no fibroma in their report. In 1933, Hara [2] reviewed the literature and listed 26 cases, to which he added one.

The pedunculated fibroma is commoner than the sessile type, and, when well developed, it may easily be thrown forward on the tongue or partly swallowed at will. During sleep it may fall into the larynx and interfere with respiration. There may be cough, salivation, abnormal nasal tone to the voice, mouth breathing, and snoring. In many cases, however, there may be no symptoms, and the tumor is accidentally discovered during routine examination or while the patient is looking into his own throat with a mirror.[2]

Fibromas may vary greatly in size from a few millimeters in diameter to one large enough to fill the entire oral cavity. They may be round, oval, or kidney-shaped and are usually single. The color has been described as a pale pinkish rose.[2]

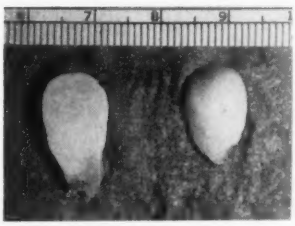

Fig. 1.—Gross specimen. (Left) Cut section showing pedicle. (Right) External surface. Metric scale at top.

Report of Case

A 27-year-old white man, on routine physical examination, Jan. 8, 1957, because of back strain, was found to have what was thought to be a mucous polyp of the left tonsil. He denied any symptoms in the throat and stated that he had always been healthy.

He was transferred to Tokyo U. S. Army Hospital, where on Jan. 20, 1957, under local anesthesia, the tumor was removed with tonsil snare.

The tumor was grayish-white, smooth, oval, and of firm consistency, measuring 1.5×1.4×1.0 cm. with a 4 mm. pedicle. The cut section of the formalin-fixed specimen was grayish-yellow and of slight streaky appearance (Fig. 1).

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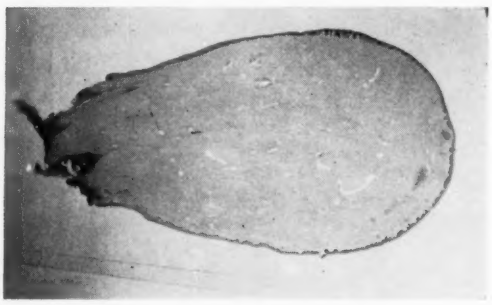
From the Otolaryngology Service and Laboratory Service, Tokyo U. S. Army Hospital. Present addresses: William Beaumont Army Hospital, El Paso, Texas (Dr. McKibben); Mayo Clinic (Dr. Bozanic).



Fg. 2.—Photomicrograph of a longitudinal section of the entire tumor, showing the epithelial surface and a few dispersed capillaries. (Hematoxylin and eosin stain; × 3.)

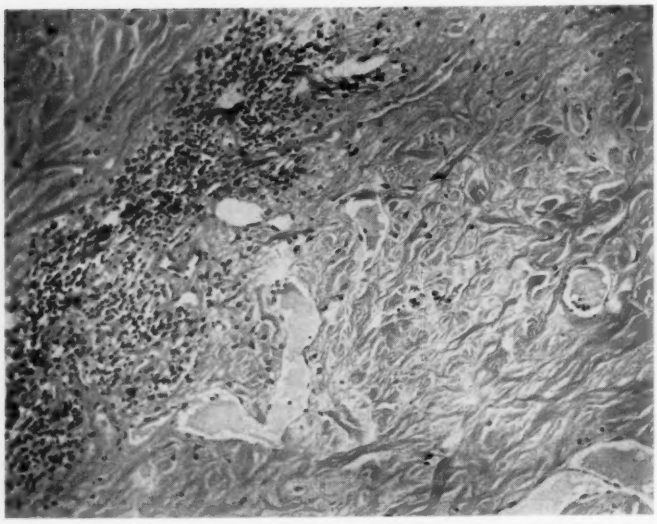


Fig. 3. — Photomicrograph of section showing interlacing strands of hyalinized fibrous connective tissue containing a few capillary structures. An area of focal infiltration of numerous lymphocytes and plasma cells is seen to the left. These cells are also diffusely scattered throughout the remainder of the section. (Hematoxylin and eosin stain; reduced about 15% from mag. × 130.)

Histologic examination* showed the tumor to be covered with stratified squamous epithelium and to consist primarily of interlacing strands of hyalinized fibrous connective tissue containing a few dispersed capillary structures. The area beneath the squamous layer was diffusely and focally infiltrated by numerous lymphocytes and plasma cells, infiltration being more pronounced at the base of the pedicle (Figs. 2 and 3).

Comment

The fibroma in this case was grayish-white, in contrast to the pinkish-rose color described by Hara. The color, no doubt, is influenced by the vascularity, which in this case was not marked.

William Beaumont Army Hospital, El Paso, Texas.

* Hematoxylin and eosin stain and Masson trichrome stain.

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Pathology of the Sphenoidal Sinus

OSCAR HIRSCH, M.D., Boston

Interest in the sphenoidal sinus began when Rouge [1] in 1872 happened to find in a cadaver a sphenoidal sinus filled with pus. But access to the sphenoidal sinus by instruments was at that time considered impossible. Zuckerkandl,[2] the anatomist, was the first to show how to reach it. Caution in exploration of this sinus still persists,[3,4] in spite of the ease of present-day methods.[5-7]

Sphenoidal sinusitis is found by the pathologist [8,9,3] in about 22% of all cases of sinus infection, either alone or combined with involvement of other sinuses, most frequently with maxillary sinusitis. This paper deals with complications due to suppurative or catarrhal sinusitis and also with pathology or tumors originating primarily within the sinus or originating outside the sphenoidal sinus and encroaching on neighboring structures. Pituitary tumors will be mentioned only in selected cases. The following cases of my own experience illustrate the points outlined above.

CASE 1.—*Suppurative inflammation of the sphenoidal sinuses with ensuing meningitis; drainage by operation; cure*

A 50-year-old woman was admitted to the hospital on Feb. 21, 1930, in an apathetic condition, with headache, vomiting, and paresis of the left oculomotor nerve. Her temperature was 100.5 F. Lumbar puncture showed 175 white cells; no growth. X-rays revealed that the right maxillary sinus and both sphenoidal sinuses were hazy. Operative exploration of the right maxillary and right ethmoidal sinuses disclosed a marked edematous swelling of the mucous membrane. Both sphenoidal sinuses were opened by the septal method at the same time. After the rostrum had been removed, thick pus poured from the sinuses in great quantity and in the end was of thick, crumbly consistency. Drainage of both sphenoidal sinuses was established, and improvement began after five days, with complete recovery. This patient was observed for 20 years, during which time there was no evidence of recurrence.

This is a case in which surgery would be indicated, regardless of the availability of antibiotics.

CASE 2.—*Edematous, catarrhal inflammation of a pocketed sphenoidal sinus with central and ring scotoma and with accommodation paresis; cured by operative drainage; twenty-four years of observation without recurrence*

A 21-year-old law student from Houston, Texas, appeared in my office in Vienna with the complaint of dimness of vision. He had had a sphenoid operation in his home town in July, 1933, following which the scotomas became smaller but later became enlarged. On my examination, the patient's acuity of vision in the right eye was 5/18; in the left eye it was normal. In the right eye a ring scotoma, and a tiny central scotoma and paresis of accommodation were found. On neurological examination there was a suspicion of multiple sclerosis. However, x-rays showed that the right sphenoidal sinus was hazy, for which reason I opened that sinus under local anesthesia, using the septal approach, and exposed a thick transparent material which did not drain through the operative breach and was therefore removed by suction. The amount was greater than the visible capacity of the sphenoidal sinus. I therefore looked for pockets and found them, according to the x-ray, in the pterygoid process. Improvement began the next day, and the patient returned home with normal acuity of vision and without scotoma. I saw this patient 24 years later in his home town and found him in the best of health. Visual impairment was most probably rhinogenic in origin, as was borne out by positive x-rays, by sphenoidal pathology, and by absence of signs of multiple sclerosis for 24 years.

CASE 3.—*Chordoma of the sphenoid causing headache, visual disturbance, hyperalgesia of the right trigeminus, left hyposmia, and weakness of the right hand; operation and postoperative radium treatment achieved temporary improvement; death ensued after five months due to rapid tumor growth*

A 25-year-old woman complained of headache when she was seen by me for the first time on Sept. 9, 1927. She had papilledema on the right and optic atrophy on the left, nasal hemianopsia in the left eye, and complete destruction of the sphenoid by x-ray. Opening of the sphenoidal

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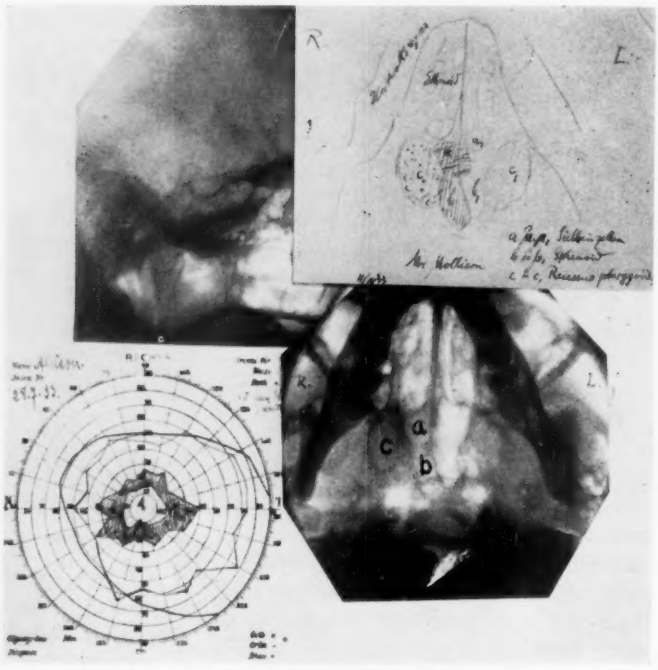


Fig. 1 (Case 2).—X-ray lateral view shows pneumatized dorsum sellae. Visual field shows central and ring scotoma in the right eye on July 28, 1933, before the operation. Sketch illustrating the x-ray: a,a_1, ethmoid; b,b_1, sphenoid; c,c_1, pneumatized pterygoid processes.

sinus by septal route revealed a chordoma. Immediate improvement followed. Radium was applied locally. Patient died six months later, owing to the rapid regrowth of the tumor.

CASE 4.—*Cystic degenerated chordoma of the sphenoidal sinus with abducens paralysis on the right side; improvement for two years after operation; death*

A 40-year-old man complained of headache from December, 1931, and of vomiting from March, 1932. Since that time double vision had developed. Neurological examination revealed an abducens paralysis on the right side and a positive Romberg. X-ray showed destruction of the sphenoid. The anterior portion of the sella was still present. Septal opening of the sphenoidal sinus under local anesthesia was performed on April 18, 1932, and revealed a tumor with partial cystic degeneration. The tissue was transparent and proved to be a chordoma; it was treated postoperatively by radium. The double vision disappeared. The patient lived for two years with normal eyesight. He died on April 15, 1934. No postmortem examination.

CASE 5.—*Carcinoma of the sphenoidal sinus with bilateral ophthalmoplegia and blurred vision; improvement after sphenoidal operation and postoperative x-ray treatment*

A 64-year-old man complained of blurred vision and bilateral ophthalmoplegia. X-ray showed hazy sphenoidal sinuses. Operative exploration by my co-worker Dr. H. Hamlin on Aug. 25, 1955, revealed that the sphenoid cavities were filled by a tumor mass. Microscopic diagnosis was transitional-cell carcinoma. The patient was treated postoperatively by rotational x-ray therapy with the 2,000,000-volt machine. Ptosis disappeared, and the movement of the bulbus was restored. Improvement has lasted to the time of writing.

CASE 6.—*Bilateral ptosis due to a meningioma reaching into the sphenoidal sinuses*

A 77-year-old woman was admitted on Nov. 28, 1955, to the R. I. Hospital. Her complaint was loss of vision and bilateral ptosis of several years' duration. Bilateral cataracts were found on examination. X-ray showed haziness of both sphenoidal sinuses. Under local anesthesia, operative exploration by Dr. Hamlin and me revealed a tumor in the sphenoidal sinuses, which, on microscopic examination, proved to be a meningioma. The patient was treated postoperatively by local application of radium. Moderate improvement of symptoms ensued, enabling the patient to do her housework.

CASE 7.—*Mucinous carcinoma of the sphenoidal sinus starting with headache and causing, within four weeks, complete bilateral ophthalmoplegia*

A 32-year-old man was admitted to Chelsea Naval Hospital on Dec. 28, 1953, with pain in the left frontal region. One day later he noticed haziness of vision bilaterally, and 10 days later

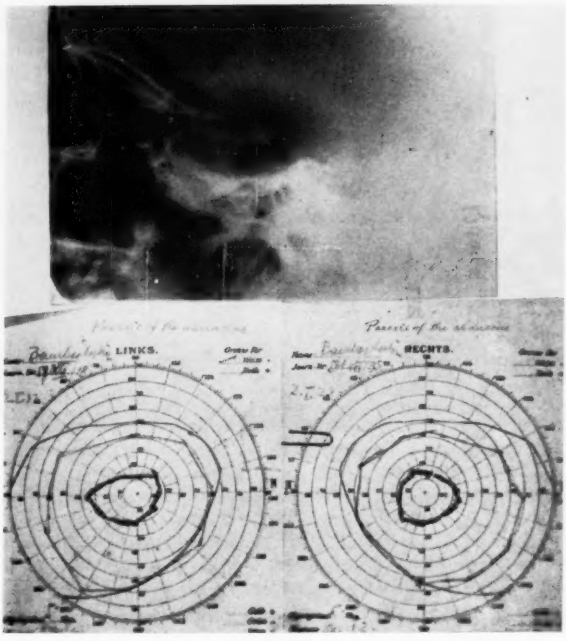


Fig. 2 (Case 4).—X-ray shows destruction of the sphenoid. Visual fields are slightly restricted.

diplopia occurred. Within one month a complete bilateral ophthalmoplegia was noticed. X-ray revealed bony erosion and cloudiness in the region of the sphenoidal sinuses. On May 10, 1955, exploratory operation of the sphenoidal sinuses by the septal route revealed a friable mass in both sinuses. The microscopic diagnosis was mucinous carcinoma. Postoperative x-ray treatment was followed by improvement which lasted six months. At autopsy a large tumor was found, which seemed to have its origin in the region of the sphenoidal sinus, involving the entire brain stem.

CASE 8.—*Undifferentiated sarcoma in a 2-year-10-month-old child leading to progressive loss of vision; transient improvement followed operation and radiation; death three and one-half months later*

A child 2 years 10 months of age was admitted, on Oct. 26, 1953, to the Massachusetts General Hospital because of progressive drowsiness and

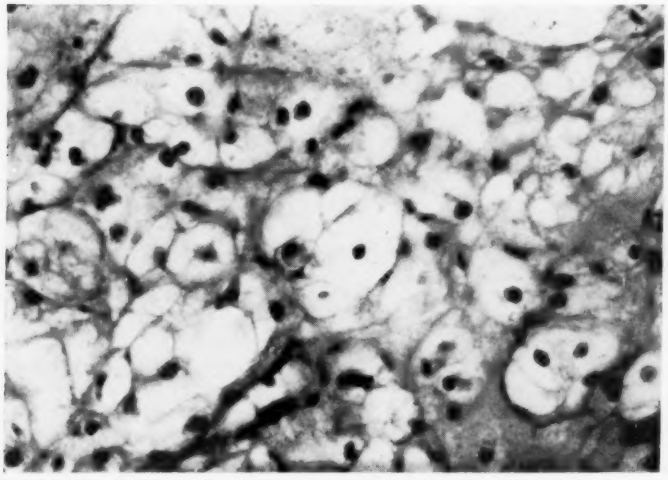
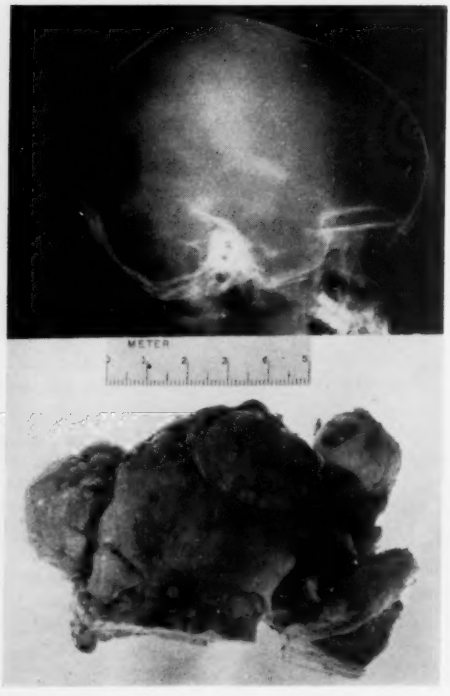


Fig. 2B (Case 4).—Microscopic picture shows the chordoma with typical vesicular cells.

Fig. 3 (Case 7).—Tumor at the brain stem. X-ray showing destruction of the sphenoid.

loss of eyesight. X-ray revealed extensive destruction of the sphenoidal bone. Exploratory operation of the sphenoid by the spetal approach was agreed upon. When the anterior walls of the sphenoid were incised, profuse bleeding occurred, and only constant suction kept the operating field clear. Sufficient tissue was removed for biopsy.

Fig. 4 (Case 8).—X-ray shows destruction of the sphenoid. Large tumor at the base of the skull and brain.



Bleeding stopped when the membranous anterior sphenoidal walls, which are continuous with the septal flaps, were replaced by putting septal flaps together. Microscopic diagnosis was undifferentiated sarcoma. X-ray treatment was instituted. After improvement for three and one-half months, the patient died of rapid regrowth of the tumor.

CASE 9.—*Craniopharyngioma in a 19-year-old woman involving the whole sphenoid, growing into the nasopharynx, and causing blindness and cachexia*

A 19-year-old unmarried woman was blind when first seen by me, and her nasal passages were found to be obstructed. She had been operated upon in February, 1950, by a rhinologist who suspected retrobulbar neuritis, because of patient's central scotoma. An ethmoid operation was performed. After transient improvement her vision failed. X-ray revealed destruction of the sphenoid. A craniotomy was performed on March 27, 1950, by a neurosurgeon, which unfortunately was followed by blindness and cachexia and did not prevent the further growth of the tumor through the sphenoidal walls into the nasopharynx. Because of impaired breathing, septal-route operation of the sphenoidal sinuses was performed by me on Dec. 2, 1950. The outgrowth of the tumor into the nasopharynx was removed. It proved to be a craniopharyngioma. By local application of radium to the surface of the tumor and by rotational x-ray therapy further growth of the tumor was arrested and its shrinkage achieved. The blindness remained. The cachexia was treated by replacement therapy, thus keeping the patient active. This local cure has lasted up to date, for six and one-half years.

CASE 10.—*Craniopharyngioma destroying the body of the sphenoid reaching to the roof of the pharynx outlined by calcification; shrinkage after*

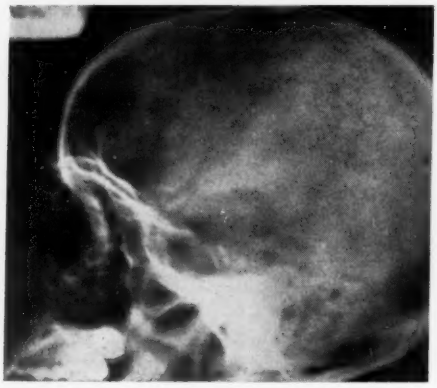


Fig. 5A (Case 9).—X-ray shows destruction of the sphenoid.

operation to a negligible remnant; cure lasting ten years

A 28-year-old man complained of unbearable headache. X-ray of the skull revealed a tumor measuring 3.5×4.3 cm., outlined by calcifications, involving the sella, the sphenoidal sinus, and the base of the sphenoid. It extended to the roof of the pharynx. Operation by the septal route on Sept. 6, 1947, revealed a cystic tumor with the contents of a dermoid cyst. It shrank within one year to 2.2 cm. in diameter. Its calcified shell remains visible in x-rays and continues to be, about 10 years after operation, a harmless foreign body within the sella.

CASE 11.—*A spongy, not pneumatized sphenoid pierced by a tantalum tube in a child 3½ years of age for the purpose of drainage of a cystic craniopharyngioma; left in position for eight years without reaction; no difference in pneumatization compared with the twin brother*

A 3½-year-old white girl, a twin, was practically blind when seen by Dr. Hannibal Hamlin and me on Jan. 3, 1949. X-ray showed a moderately enlarged sella above a spongy, not yet pneumatized sphenoid. The air study revealed a large suprasellar tumor (craniopharyngioma) without calcification. With use of the septal approach, a canal was drilled through the sphenoidal body by a dental drill, on June 30, 1949. A cystic tumor was encountered. Its wall was partly excised, and a honey-like content was drained by a tantalum tube inserted for permanent drainage. For about two years the tube dipped into the cyst; now it is seen in x-ray as having slipped out of the cavity. It has fulfilled its purpose. The child recovered full acuity of vision in the left eye and a remarkable part of field of vision. X-ray revealed a remarkable shrinkage of the tumor. The child is growing more slowly than her twin brother. The pneumatization of the sphenoidal sinus is the same as that of her brother. It is now eight years since her operation.

CASE 12.—*A 53-year-old woman was operated on for a tumor within the sphenoidal sinus; an aneurysm was encountered; patient died; no autopsy*

A 53-year-old woman was admitted to the hospital on Oct. 12, 1955, for a transsphenoidal operation of a tumor within the sphenoidal cavities. The x-ray taken from the right side showed that the tumor reached up to 3 mm. behind the anterior wall of the sphenoidal cavity. The contour of the sella was faintly visible.

An exploratory operation was agreed upon. The sphenoidal sinuses were opened by the septal method with the patient under general anesthesia. The tumor was encountered. A smooth bluish mucous membrane of the sphenoid, such as is usually found after opening of the sphenoidal

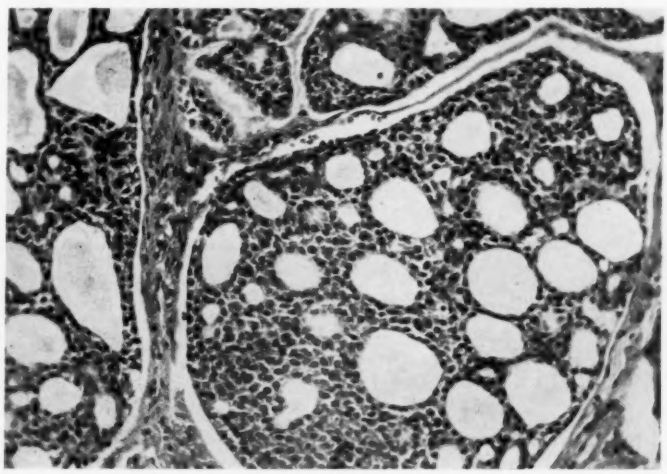


Fig. 5B (Case 9).—Microscopic picture of the craniopharyngioma shows numerous small cysts lined by basal cells.

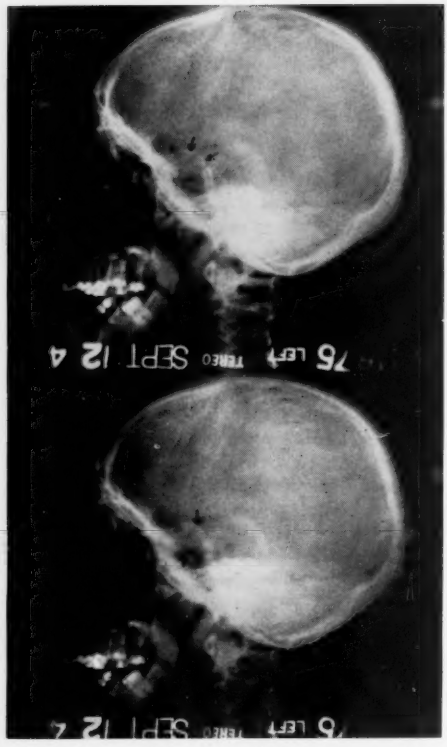


Fig. 6 (Case 10).—X-ray before the operation; arrows outlining the tumor with calcified wall. X-ray after operation; arrows outlining the shrunk tumor.

cavities, was missing. The mucous membrane was rough like sandpaper and slightly exfoliating. The tumor was punctured in five places by a long 20-gauge needle. In one place cerebrospinal fluid was obtained. No fluid was aspirated by other punctures. An incision was made between the points of negative puncture and was followed by a gush of blood. Patient died. No autopsy was held. The clinical diagnosis was aneurysm.

Review

Case 1. Age 50, woman; meningitis; sinusitis; operation; cure

Case 2. Age 21, man; scotoma plus accommodation paralysis; sinusitis; operation; cure

Case 3. Age 25, woman; visual and cerebral nerve affection; chordoma; operation; radium improvement; death after six months

Case 4. Age 40, man; abducens paralysis; chordoma; operation plus radium; improvement for two years; died

Case 5. Age 64, man; visual symptoms; carcinoma; operation plus x-ray; improvement

Case 6. Age 77, woman; visual symptoms; meningioma; operation; radium; improvement

Case 7. Age 32, man; ophthalmoplegia; carcinoma; operation plus x-ray; improvement six months; died

Case 8. Age 2 years 10 months; loss of vision; sarcoma; operation; x-ray; improvement three and one-half months; died

Case 9. Age 19, woman; loss of vision; craniopharyngioma; operation; radium and x-ray; improvement of general condition six and one-half years; alive

Case 10. Age 28, man; headache; craniopharyngioma; operation; cure 10 years; alive

Case 11. Age 3½ years, girl; loss of vision; craniopharyngioma; operation; drainage by tantalum tube; improved eight years; alive

Case 12. Age 53, woman; malaise; aneurysm, preoperatively not diagnosed; death

Comment

Of the 12 patients discussed in this paper, one had suppurative sphenoiditis causing meningitis; 1 had catarrhal sphenoiditis with visual disturbance; 2 had carcinoma; 2 had chordoma with cerebral nerve involvement; 1 had sarcoma with loss of vision; 1 had meningitis with ptosis; 3 had craniopharyn-

Fig. 7 (Case 11).—*A*, x-ray with tantalum tube dipping into the cystic craniopharyngioma taken at the end of the operation, June 30, 1949. *B*, x-ray taken seven years after operation; tantalum tube has slipped out of the tumor cavity. *C*, x-ray of the twin brother taken at the same time shows no difference in pneumatization of the sphenoid.

giomas, 2 of them with blindness, and 1 had an aneurysm. This variety of pathology was discovered by x-ray. The nature of the pathology was recognized by operation. In two patients the complications were due to inflammatory processes; in five they were due to malignant tumors; in four to tumors which anatomically or clinically were benign, and in one to an aneurysm. Complications due to inflammatory processes were observed in the preantibiotic era and cured for life by operation. Complications due to benign tumors were symptomatically cured and have been observed for from 1½ to 10 years, so far. Those patients who had complications due to malignant tumors survived because of operative treatment plus radiation for from three and one-half months to two years. The youngest patient on whom the sphenoidal septal exploration was successful was 2 years 10 months old. The oldest patient was 77½ years old. There was one operative fatality in an aneurysm not diagnosed preoperatively. All explorations were performed by the endonasal septal method, five under local anesthesia (three during the preantibiotic era) and seven under general anesthesia.

The endonasal septal method of opening the sphenoidal sinuses is based on submucous resection of the septum, which is carried out as far as the anterior walls of the sphenoid. They are pierced and removed from this breach. The mucous membrane of the septum is infiltrated with 1% procaine solution plus phenylephrine (Neosynephrine) even if the operation is done under general anesthesia, in order to restrict bleeding. I found to my satisfaction that this method is easily applicable also in young children. The advantage of the septal approach as compared with the external method using the exenteration of the ethmoid is that the septal method permits the opening of both sphenoidal sinuses at the same time, that bleeding is usually negligible, and that it prevents undesirable injury to the neighboring structures. Bleeding from a tumor which has eventually to be explored can be easily controlled by replacement of the membranous anterior walls which are continuous with the septal flap. Biopsy specimens are easily taken by the septal method, and they, on the other hand, facilitate decision as to whether radiation should be used; this method also offers a permanent drainage or a permanent approach to the sphenoidal sinus, so that additional operations can be performed and radium can be applied locally.

These curative and exploratory operations on tumors and diseases developing within or reaching into the sphenoidal cavity are the basis on which rhinoneurosurgery can be established.

186 Commonwealth Ave. (16).

Summary

A case history of meningitis and one of visual disturbance due to sphenoidal sinusitis are presented.

Case history of 10 patients with tumors reaching into the sphenoid are presented.

The septal method of approach was used in all patients and proved to be suitable.

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An Uncommon Case of Neurogenic Nasal Tumor

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We report a case of primitive tumor of the nasal fossa, whose histological interpretation has given rise to some difficulties.

Report of Case

The patient, a boy aged 13, was first seen in October, 1953, with a history of nasal obstruction and frequent epistaxis from the right nasal fossa. A polyp was observed in the right nasal cavity and removed. The specimen was taken to a pathologist, who made a histological diagnosis of chordoma.

The patient recovered completely and was quite well until summer, 1954, when he noticed again a nasal obstruction which was accompanied by bloody ichorous discharge; he complained further of a slight pain in the frontal region and the root of the nose and of frequent headaches. A relapse of the tumor in the right nasal cavity was diagnosed, and a small portion of the mass was removed for histological examination. The biopsy report was again of chordoma.

The patient was then sent to the Ear, Nose, and Throat Clinic of the University of Milan for radical treatment. He was admitted on Oct. 30, 1954. The general conditions were fairly good; only a slight but well-compensated mitral disease was found. Other clinical data: BP 105/75; blood sugar 0.82 mg. per 100 cc.; azotemia 0.28%; Wassermann reaction: negative; urinalysis: normal.

Local Findings.—The shape and aspect of the external parts of the nose were normal. The septum showed a slight deviation to the right, and the left inferior concha appeared to be hypertrophic. In the right nasal fossa anterior rhinoscopy revealed a polypoid mass projecting from the middle meatus. The tumor was the size of a hazelnut, its color was a reddish-brown, and its consistency was soft and elastic. The x-rays showed bilaterally cloudy antra and ethmoids: the base of the skull appeared to be normal. A polyp-like image could be seen on the medial wall of the right antrum. These findings were confirmed by lateral projections, where only a slight thickening of the soft pharyngeal tissues could be noticed.

Accepted for publication May 14, 1957.

From the Otorhinological Clinic of the University of Milan and from the Pathology Department of the Cancer Institute of Milan.

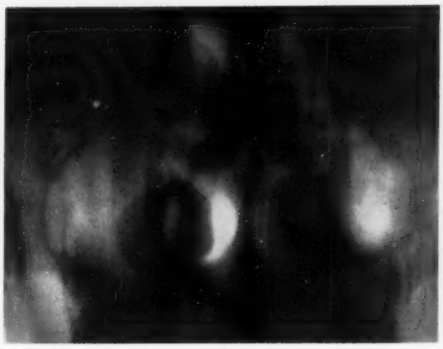

Fig. 1.—Tomography in frontal projection. A polyp-like mass appears to be inserted on the medial wall of the right antrum.

Tomography in lateral and frontal projections (Fig. 1) failed to show any involvement of bone tissues and could establish the presence of a polyp-like mass inserted on the medial wall of the right antrum. A new biopsy was performed on Dec. 2, 1954, and the tumor was provisionally diagnosed as neural, probably originating from the olfactory mucous membrane.

Surgery was performed soon afterwards by Professor Pietrantoni. A paralateral nasal incision (Moure's) prolonged as far as the upper lip, cutting it completely through, was chosen as approach. The cortical portion of the antrum in the canine fossa was then removed and the frontal process of the maxilla demolished. The tumoral

Fig. 2.—Surgical specimen. The tumor, arising from the ethmoid, had partly destroyed the medial wall of the antrum and projected downward, both in the antrum and in the nasal fossa.

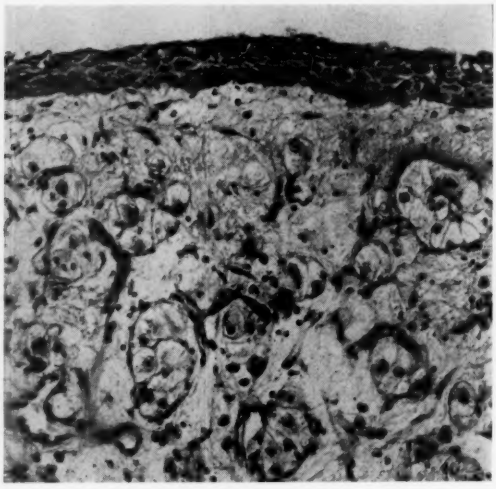

Fig. 3.—Photomicrograph of the tumor, showing under a pluristratified epithelial layer several nests of neoplastic cells with a glandular structure.

mass was found to have destroyed the lower and anterior part of the nasal portion of the sinusal wall. The tumor, which apparently arose from the ethmoid, was then excised with removal of the whole middle turbinate and the anterior part of the lower turbinate, thus creating a large cavity comprising the antrum and the nasal fossa.

One month later two courses of x-ray therapy (4100 r) were given in the nasal and zygomatic region. Thirteen months after this combined treatment, the patient was found to be in good health without any sign of relapse.

Histological Appearance.—The various sections examined show that the specimen is covered by an intact, flat pluristratified epithelial layer. The submucous connective tissue, in which there are several vessels, is infiltrated by a tumoral growth composed of cylindrical cells of various sizes, with a weakly acidophilic granulated or sometimes vacuolar cytoplasm (Fig. 3). Their nuclei are partly small and round with compacted chromatin, and partly large with dispersed chromatin, showing an evident nucleolus.

These cells show a rank-like disposition, and many sinusoid capillaries can be seen to run in between (Fig. 4). Owing to the fact that the cellular nuclei of one and the same rank are disposed at different heights, the various ranks assume a multiseriate aspect (Fig. 5). Some of the tumoral cells show the presence of melanin granules (Fig. 6). This tissue did not stain with Best's technique.

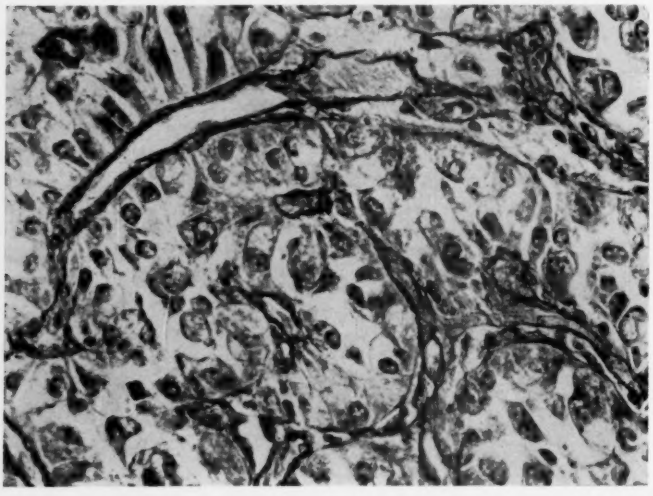

Fig. 4. — Photomicrograph. Bielschowsky stain. Large sinusoid capillaries are arranged between the ranks of tumor cells.

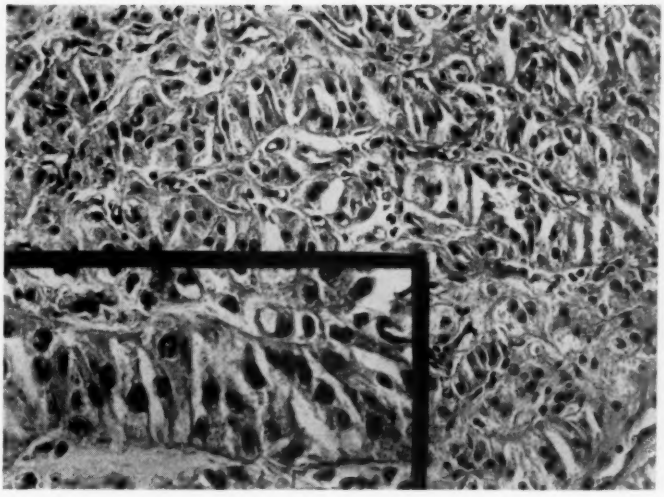

Fig. 5. — Photomicrograph. The cylindrical tumor cells are arranged in ranks. The great similarity between them and the sustentacular cells of the olfactory mucosa is evident.

The histological picture being such an unusual one, only a descriptive diagnostic report could be given, viz., one of a cylindrical-cell tumor, rich in melanin, probably originating from the olfactory mucous membrane.

Comment

As stated before, at the beginning a chordoma was diagnosed, but we were not able to establish such a diagnosis, as the disposition and the morphological aspects of the tumor cells were quite different from the typical physaliphorous cells of chordomata, and, further, reaction to the Best stain was negative, and melanin was present. Besides, the absence of any bone involvement did not suggest such a diagnosis. In order to ascertain the diagnostic problem posed by this tumor, we sent a certain number of slides to different pathologists. We should like to refer briefly here to the various reports we have received.

Dr. Stout (from the Department of Surgical Pathology, Columbia University, New York) considered it to be a melanoblastic, probably neurogenic, tumor, but did not believe it to have originated in the olfactory

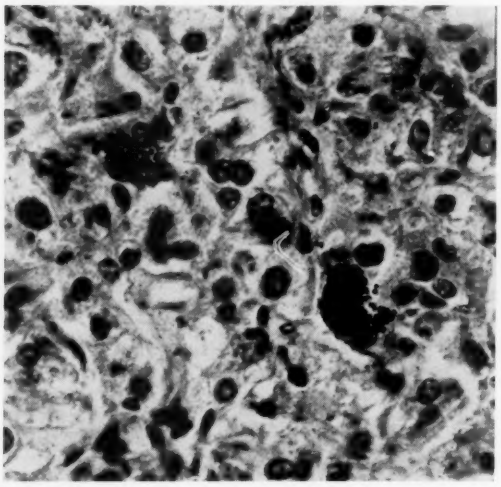

Fig. 6.—Photomicrograph showing granules of pigment within the cytoplasms of the neoplastic cells. The pigment stained by the Bloch technique, revealing it to be melanin.

cells, thus excluding the possibility of its being an esthesioneurocytoma. A neurogenic nature was also admitted by Dr. Lattes (Department of Surgical Pathology, Columbia University) who considered these tumor cells to have melanoblastic activity. Professor Engelbreth-Holm, Dr. Teilum, and Dr. Christensen * (all from the Institute of Pathology, University of Copenhagen, Denmark) on the contrary, believed the tumor to be of the epithelial type. The former suggested further the possibility of a melanoma, and the latter two admitted a glandular structure.

In our opinion, the disposition of the vessels (closely resembling that of endocrine tissues), as well as the presence of melanin, are not in favor of a diagnosis of epithelial tumor. Actually, the histological picture of the tumor reveals three characteristic features:

1. The tumoral cells closely resemble the so-called Schultze cells of the olfactory mucous membrane.
2. The vascular distribution (sinusoid capillaries) appears to be the one we may observe in endocrine tumors.
3. The presence of melanin granules in the cellular cytoplasm is rather a frequent occurrence.

We believe that the most striking aspect is the similarity between the tumor cells and the sustentacular cells of the olfactory mucous membrane. Actually, our initial diagnosis of "neural olfactory tumor" was based mainly on this feature.

A review of the literature did not reveal any histological picture similar to the one we have observed. It is well known that tumors arising from the olfactory mucous membrane, which were first described by French and Portuguese authors and—quite recently—in the United States, too, can be divided, according to Berger and co-workers into two main forms: the esthesioneuroepithelioma and the esthesioneurocytoma. Neither of them, and our opinion is shared by Dr. Stout, can be likened to the tumor we are reporting on. There are other aspects which support our view on the origin of the growth, i. e., the particular disposition of the blood vessels, which is quite similar to that of the submucous layer of the middle turbinate of the nose. As we have said before, it recalls, too, the vascular architecture of some endocrine new growths. There remains, however, one questionable point, viz., the presence of melanin, but we are inclined to admit the origin of these melanoproductive cells—according to the views of Masson—from the primitive neuroepithelium, thus confirming the neuroepithelial nature of the tumor.

The histological picture of this tumor appears to be a benign one, but it is known that the problem of the clinical malignancy of neurogenic nasal tumors is not yet settled. As a matter of fact, benign cases successfully treated by x-rays as well as forms with local recurrences and metastases are reported in the literature.

In our patient a combined treatment (surgery followed by an x-ray treatment) was chosen as it appeared to offer the best chances of cure. Thirteen months after this treatment the patient is well and free from recurrences. He is kept under control, and the late results will show us if our scheme of therapy has been a correct one.

Summary

We present a report on a small polyp-like tumor of the nose, which was observed in a boy aged 13. Recurrences had been previously observed after two local interventions.

The histopathological picture was a very uncommon one: The section showed closely packed ranks of cylindrical cells, resembling Schultze's cells, a network of sinusoidal capillaries arranged like the ones in endocrine organs, and the presence of intracellular melanin granules.

Radical surgery was performed, followed by a high dosage of x-rays. From the histological point of view, the diagnosis offered great difficulties; the possibility of an unusual type of melanoma or of an epithelial tumor was suggested by other pathologists. We consider it to be a hitherto unknown type of neuroepithelioma with marked

* Personal communication to Dr. Teatini.

melanogenesis. The tumor probably originated in the olfactory mucous membrane.

Via F. Sforza, 35.

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Glabella Perforator

IRVING B. GOLDMAN, M.D., New York

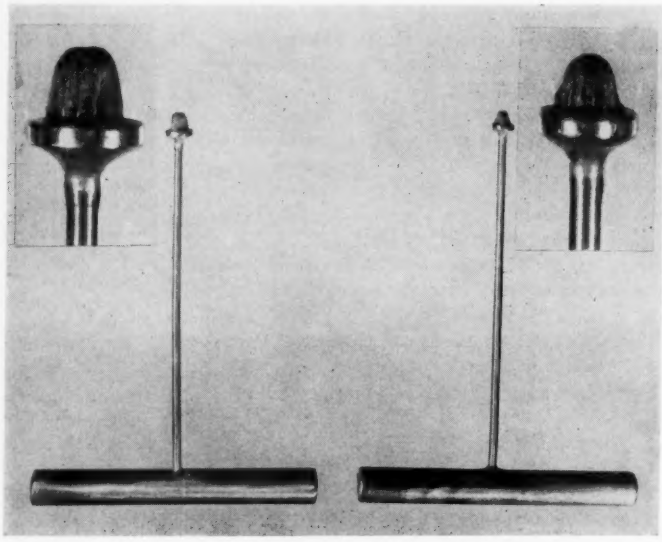

Fig. 1.—Photograph of trephines. Note two-sized hand burs and rims which limit penetration into bone.

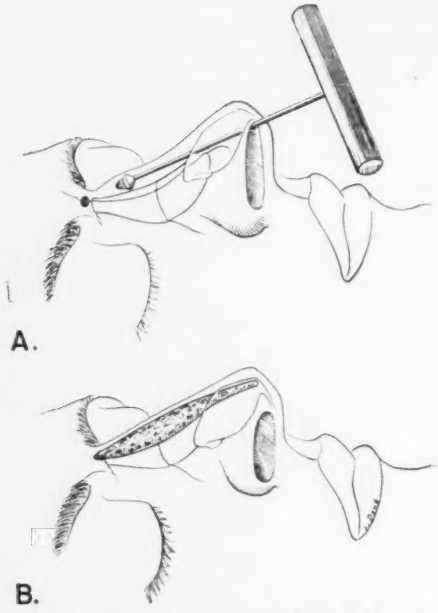

Fig. 2.—*A*, hole prepared with trephine. *B*, cephalic end of bone graft placed in glabellar niche for stabilization.

One of the hazards involving bone grafts inserted for correction of a nose is the possibility of shifting despite proper positioning at the time of the operation. In order to eliminate this occurrence, the graft should be fixed firmly. By means of a depression made in the desired nasofrontal osseous region for reception of its cephalic surface, the implant becomes anchored. The pit is made by glabella perforators. These two similar-shaped instruments have handles with 4 in. shanks and round cutting burs of two sizes, one, 3 mm., the other 4 mm., with a small rim behind each belly which limits deeper penetration.

The bony implants are secured in the nasofrontal region by first making a depression with the smaller-sized hand bur to a depth of about 2 to 3 mm. This is replaced by the larger bur, and an adequately sized pocket is made for the reception of the prepared implant. The appropriately modeled bony graft, ready for permanent placing, is inserted into the nose, and the apex is implanted into the burred hole. A good setting is assured.

121 E. 60th St. (22).

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Surgical Rehabilitation of Voice Following Laryngofissure

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The voice after laryngofissure may be quite satisfactory; may be hoarse but fairly strong; or rarely may be aphonic, hardly audible. The quality of the voice depends to a great degree on the position of the cicatricial tissue which takes the place of the removed false and true vocal cords. The voice is strong if the normal vocal cord does not have to cross the median line in order to reach the cicatricial cord-like structure. If the newly formed cord is fixed in the paramedian position, the normal vocal cord may well compensate by slightly crossing the midline. Speech therapy may be quite helpful in this group in producing an efficient, slightly hoarse speaking voice. Speech therapy, however, has little or nothing to offer if the cicatricial cord happens to be formed in a position of extreme lateral abduction. The voice is weak and aphonic. There is considerable air waste. The disability thus produced is quite similar to the aphonia which is caused by unilateral paralysis of the vocal cord fixed in abduction. The number of patients with cicatricial cord is fixed in abduction is small. The weakness of voice, however, proves to be a severe handicap in many professions. The inability of such a patient to continue his usual activity led to devising the surgical procedure which is described below.

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From the Department of Otolaryngology College of Physicians and Surgeons, Columbia University, and The Presbyterian Hospital.

A 59-year-old white male postal employee presented the history of persistent hoarseness of six months' duration. Biopsy revealed a squamous-cell epithelioma. The right true and false vocal cords were removed through a classical laryngofissure. The postoperative course was uneventful, except for a granuloma, which was removed from the anterior commissure 11 weeks after the laryngofissure. The voice continued to be very weak, and there was strong air waste present on phonation. The right arytenoid cartilage and the cicatricial cord were found to be fixed in abduction, and the glottic chink stayed wide open during phonation. Patient received speech therapy for four months, and this resulted in somewhat improved approximation of the two cords during phonation. The voice, however, remained weak and the air waste was obvious.

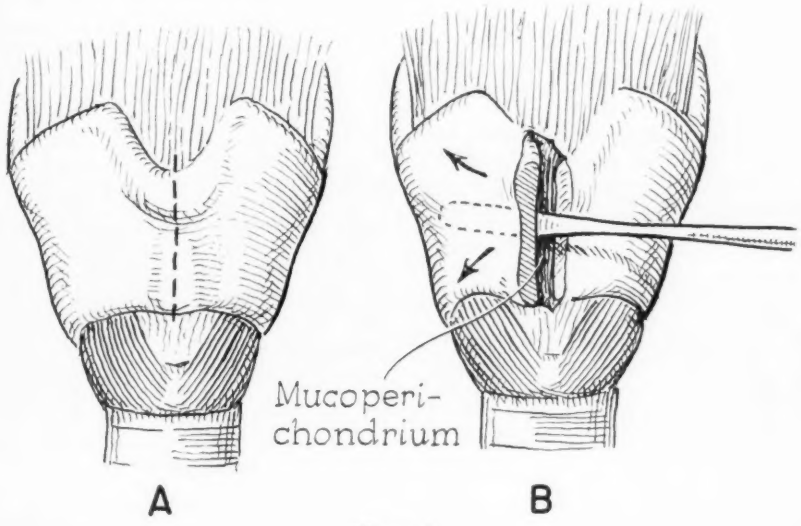

Figure 1

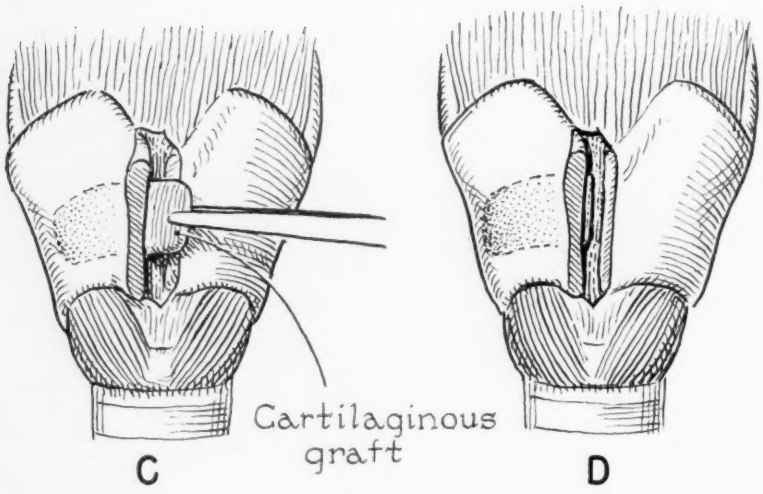

Figure 2

Two years after laryngofissure the patient was readmitted for surgical correction of the voice. Under local anesthesia a vertical incision was made through the old scar, starting at the level of the thyroid notch. A tracheotomy tube was inserted. The thyroid cartilage was split in the midline and the perichondrium was elevated from the inner aspect of the right ala without entering the lumen of the larynx (Fig. 1). A large piece of rib cartilage was then inserted between the right ala and the perichondrium. The cartilage graft was shaped in length to reach the vocal process of the arytenoid (Fig. 2). With some experimentation a piece of cartilage was selected which produced the desired result of pushing the cicatricial cord to the median line. Selection of the proper size of the graft was made by visualization of the displacement of the cicatricial cord by direct laryngoscopy. The cartilage was intentionally made large enough to fill the perichondrial pocket in order to prevent later shifting of position. The voice became strong and easily audible on testing at this stage of the operation. The thyroid alae were then approximated with 000 chromic absorbable surgical sutures and the muscles were sutured together, thus covering the thyroid alae.

The voice remained strong and was quite satisfactory. The patient was last seen 16 months after operation, and the cicatricial right cord remained in a median position (Fig. 3).

Recording of the voice preoperatively and then at frequent intervals after the operation demonstrated the patient's progress. Soon after the operation the patient was able to talk without experiencing fatigue, but his voice was "raspy." Since the volume was adequate, postoperative speech therapy was concentrated on better coordination and relaxation.

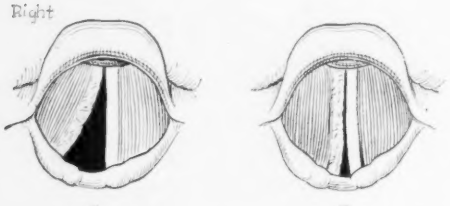

Fig. 3.—*A*, appearance of vocal cords on phonation before operation. *B*, appearance of vocal cords on phonation after operation.

Comment

The above-described surgical technique closely resembles a procedure recommended by Meurman[1] in 1942. He implanted a piece of rib cartilage between the bulk of the inner laryngeal muscle and the thyroid ala. He used this procedure to improve the voice of patients who had unilateral paralysis of the recurrent nerve with the cord fixed in abduction. A modification of Meurman's technique was presented by Opheim.[2] He prefers to place a small piece of cartilage into a pocket which he prepares in the soft tissue laterally but in the immediate vicinity of the paralyzed vocal cord. Morrison reports a personal communication of Brien T. King about a surgical procedure he used to restore voice in a case of aphonia due to unilateral paralysis of the cord in abduction. This essentially consists of disarticulating the arytenoid cartilage and fixing

it on the upper border of the cricoid cartilage in order to pull the paralyzed cord to the midline. Morrison[3] used a similar technique in treating aphonia in a case in which the ankylosed arytenoid was fixed in abduction. He obtained good functional voice and adequate airway.

These earlier surgical techniques were used to cure aphonia in unilateral paralysis of the recurrent nerve with fixation of the cord in abduction. They were very instructive in devising the procedure described in this paper, although it was used here to improve aphonia caused by laryngofissure. Medial displacement of the cicatricial cord, including the vocal process of the arytenoid, is the important step in producing an adequate voice. Local anesthesia makes testing of the voice possible during the operation and eliminates a potential source of error. The number of patients who would benefit from this operation is small. Simplicity of this surgical measure may attract more attention to aphonia caused by laryngofissure.

Summary

A surgical procedure is recommended to improve aphonia following laryngofissure.

This operation consists of placing a cartilaginous graft lateral to the cicatricial cord.

The indication for this approach is aphonia resulting from extreme lateral fixation of the cicatricial vocal cord following laryngofissure.

A case history of such a patient is given.

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Progress in Otolaryngology

Otitis Media and Complications

Summaries of the Bibliographic Material Available for 1956

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An increasing attention to the problem of conservation of hearing marks a large number of the articles for 1956. Papers on tympanoplasty are an indication of the awareness of the importance of this problem.

Diagnosis

Kobrak [1] (Detroit) stated that in the past when the inflammatory phase had burned out, the treatment of conduction lesions was neglected by otologists. The recent interest in tympanoplasty has revived interest in the differential diagnosis of conduction-hearing impairments. He showed photographs of two very badly scarred ear drums, one being that of a patient who heard amazingly well. "It is evident . . . that the otologist cannot predict the hearing loss created by the tympanal pathology. . . . Our ignorance of simple fundamental aspects of conduction lesions is embarrassing and hinders surgical development." He therefore suggests that we study each case in the following manner: first, by closing the perforation with a piece of latex rubber (better than a cotton pellet because the cotton may touch the head of the stapes and produce a "columnella" effect, or reach the round window and produce a "sound shadow" effect); second, the acoustic probe, either electrical or the Pohlman type, should be used. He found that the hearing improvement is more easily obtained and longer maintained by an artificial eardrum than by a window prosthesis. If, however, the ear were moist, the artificial drum would be the method of choice. By using these tests, an accurate differential diagnosis of the conduction-type hearing impairment is possible. He has devised a simple method of photographing the eardrum. Anyone interested should examine the photograph in his article.

Laff and Smith [2] (Denver) described an easy caloric test for vestibular function. They drop 70% alcohol, at room temperature, into the ear canal (exact amount not mentioned) with the patient's head held as nearly horizontal as is comfortable. With an ear speculum in place and with the help of a standard head mirror, a jet of air is directed into the ear canal along the posterior superior border in order to effect the cooling from evaporation as close to the labyrinth as possible. After 30 seconds the head is held erect, and the onset and duration of nystagmus is timed and recorded. They have not hesitated to use this test in cases of perforation of the drum and have noticed no bad effects.

"It is conceded that the quantitative caloric testing has its place . . . and should be encouraged when complete neurological problems are being investigated. In the busy physician's private office the contemplation of such elaborate methods only serves to engender one postponement after another of this vital procedure." They have done this simple test on every case of systematized vertigo seen in the past four years. Since the materials are always handy and the time

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required is so short, this quick screening test should be valuable.

Sellers [3] (Dallas) has been interested in neurotology for a long time and has been seeing, as consultant, all such cases from the nearby Veterans' Hospital. He has written an interesting article in which he describes how he separates the "high" lesions from the "low" lesions. The high lesions are those located above the tentorium and the low lesions are in the cerebellum. Lesions in the cerebellopontine angle seem to have their own syndrome and are not considered in this article.

The Barany turning tests are done first, as they are the true physiologic tests. "Failure to perform them must be accounted negligence." Since 1940 Sellers has used the Atkinson technique as the basic caloric test. This consists of injecting 1 cc. of ice water into the ear canal instead of douching with different temperatures of water. In normal cases the ratio of the latent period to the duration of nystagmus is quite constantly 1:4. The average latent period is 20 seconds and the duration time about 80 seconds. Shortening of the latent period in relation to the duration time, such as 15 seconds to 75 seconds (1:5), denotes hyperactivity or irritation. Lengthening of the latent period (25:75, or 1:3) indicates hypoactivity by suppression or blocking. He reported 52 cases with detailed results of the examination, many of them having been checked by operation.

He concluded that when the lesions were high and localized the caloric test was affected and the responses to rotation were normal. Contrariwise, when the lesion is low and localized the reverse results will be found, disturbed rotation tests with normal cold caloric tests. In either high or low lesions the responses will be hyperactive if the lesion is irritative, and hypoactive if the lesion is destructive. Correct localizations were made in 42 of 49 cases.

Hallpike [4] (London) advises mass caloric irrigations for diagnosis of suspected intracranial lesions, using water 7 C (13 F) above and below body temperature. He prefers to have the patient lying on a couch with the head elevated about 30 degrees. The water is allowed to flow freely for 40 seconds, using 250 to 500 cc. The duration of nystagmus is recorded from the time the irrigation is started, the latent period being ignored. The use of one temperature only (hot or cold) would be enough to indicate canal paresis, but it is necessary to use both to detect "directional preponderance." In canal paresis the affected side will give a shorter duration of nystagmus to both hot and cold, while with lesions of the temporal lobe there will be longer duration of nystagmus toward the lesion with both hot and cold water. The differential diagnosis of Ménière's disease, vestibular neuronitis, tumors of the eighth nerve, and lesions of the temporal lobe are taken up, and summaries of findings of each type of case are analyzed.

(These three articles dealing with caloric tests are well worth study by otologists. The article by Hallpike is already a condensation of many previous articles and cannot well be condensed further.)

Tympanoplasty

Wüllstein [5] (Würzburg, Germany) has done about 500 tympanoplasty operations and finds only two contraindications to the procedure. They are complications of the middle ear which are a danger to life, and inadequate function of the inner ear so severe that improvement of sound conduction would be without result. The patency of the Eustachian tube should be tested before operation. An artificial drum should be placed and the hearing tested. If the hearing is better with the membrane, this is proof that both windows are functioning properly. The electric probe should be used.

About one-third of all his tympanoplasties consist of cases in which the malleus and incus are so defective they must be removed. The bridge must be taken out and the new drum placed upon the head of the stapes. The per cent of good results is small in this

group. Where the crura of the stapes are absent, he places a small wedge-shaped plastic columnella on the footplate of the stapes with the skin graft resting on the head of the wedge. He takes his skin graft from behind the ear and sometimes uses a mucous membrane graft from the lower lip. He finds he can obtain a better view of the round window from behind the ear, so is using the retroauricular approach. He has less than 10% of recurrent perforations, usually small marginal ones that can easily be closed by a second operation.

Wüllstein[6] (Würzburg, Germany) described his five types of tympanoplasties and illustrated them with diagrams. His Type 1 has perforations of the drum and no other pathology, and is repaired by skin grafts after removal of epithelium at the edges of the perforation. Type 2 includes those cases with slight defects of the ossicular chain; they are repaired, leaving a middle ear of about the same size and depth. Type 3 cases have large defects of the malleus and incus, making it necessary to remove them. The skin graft is laid directly over the head of the stapes. Type 4 cases have a movable footplate of the stapes but the crura are missing. Repair of this type attempts to reconstruct a middle ear consisting only of the tube and hypotympanum with sound protection for the round window. Type 5 cases have a fixed footplate of the stapes and require fenestration and skin graft.

He does not hesitate to operate in cases of chronic otitis with active suppuration. He uses gelatin saturated with antibiotic to fill the space below his grafts. He strongly advises the use of the binocular microscope.

In the discussion it was emphasized that the technical difficulties of the operation were very great. Edmund Fowler Jr. (New York) advised that we do not discard the Kobrak method of using hydrophilic ointment, Pohlman's technique, and other forms of prostheses. "These may improve the hearing as much or more than an elaborate tympanoplasty . . . and in my opinion are the treatment of choice in a suppurating ear." Altmann (New York) said that even after visiting Wüllstein's clinic twice he still found the procedures difficult. He said that tympanoplasty is not a special method of operation, but a special approach to the treatment of chronic middle ear disease. It was mentioned that to properly treat every detail of the middle ear might make the operation a four-hour procedure.

Zöllner[7] (Freiburg, Germany) described a type of chalky deposit occurring in the drum which he thinks is a result of otitis media. He calls this tympanosclerosis and quotes von Troltsch who described it in 1873. He has seen these white deposits completely surrounding and fixing the stapes. He advises removal of these deposits when they cause impairment of hearing whether located in the drum or around the stapes. When there results a perforation of the drum he repairs this with a skin graft. His article shows two audiograms in which the hearing was much improved by the operation.

Ormerod and McLay[8] (London) wrote an interesting and well-illustrated article describing their plastic operations on the drum and middle ear. Their diagrams of the different procedures are very clear. They test the function of the ossicular chain with an electrical acoustic probe. The probe is applied to the handle of the malleus, to the promontory, and to the head of the stapes. If the sound is heard best on the handle of the malleus, it is a sign that the ossicular chain is normal. If the sound is heard best at the head of the stapes, the footplate is mobile and the ossicular chain is not functioning. Where the ossicular chain is intact, a simple skin graft is all that may be necessary. If there is greater destruction, it is necessary to remove the nonfunctioning ossicles and place grafts in different places. The article does not give the number of patients operated on or the per cent improved.

Kley[9] (Würzburg, Germany) reported six cases of tympanoplasty with improvement of hearing from 15 to 20 db. He tried the technique of implanting a plastic colum-

nella between the footplate of the stapes and a skin graft closing a large perforation. He found the plastic columnella unsatisfactory and showed a photograph of the plastic material penetrating the new drum. He states that Zöllner and Mundnich had also found this technique unsatisfactory. (Wüllstein said [personal communication] that Kley had changed the shape of the plastic wedge and was now using it with success. Many operators are now doing tympanoplastic procedures and we shall soon have more figures on the per cent of successful results in the different types of cases. All agree on the necessity of magnification and on the difficulties of some of the procedures.)

Acute Otitis Media

Søhoel [10] (Oslo, Norway) did audiometric examinations on 151 children that had recovered from acute otitis media. All were at least 7 years old when the audiograms were made. He found that 26% of the cases showed impaired hearing. The duration of the otitis media was most important, since only 5% of those having otitis media lasting less than two weeks had any hearing loss. The frequency of the hearing loss rose rapidly as the disease lasted longer than two weeks. The ears on which a myringotomy had been done developed impaired hearing only half as frequently as the ears that had been allowed to rupture spontaneously, and the duration of the otitis was shorter among the myringotomized patients. About 65% of the cases, the most serious, had cultures done. Among the 17 cases in which the culture showed Pneumococcus Type III, 50% developed hearing loss; while in the 98 cases with hemolytic streptococci, 30% became deafened. This study was carefully done and shows about the same per cent of hearing impairment as the studies of Lundgren and others.

Asay and Hartman [11] (Fontana, Calif.) treated 74 cases of acute otitis media and 26 cases of acute tonsillitis with a single injection of 600,000 units of dibenzylethelenediamine dipenicillin G. They had 23% failures in the acute otitis media cases and 7.7% failures in the acute tonsillitis group. They also found that the pain at the site of the injection was so severe and persistent that many of the children were extremely fearful upon returning for reexamination.

Kos [12] (Iowa City) urged that more attention be given to infection of adenoids and sinuses in order to prevent damage to hearing. "Adenoidectomy should be done as early as possible to prevent irreversible changes taking place in the Eustachian tubes and middle ear. A middle ear infection is not a minor one, for one of the most essential special senses is at stake." Antibiotics for otitis media should be given for a minimum of five to seven days.

Chronic Otitis Media

Bourdial and Debain [13] (Paris) wrote an interesting article on chronic otitis in children in which they call attention to the differences between the chronic otitis of adults and children. They see many children who have had a simple mastoidectomy in whom there occurs from time to time an abscess under the scar. "The term recurrent mastoiditis is a mistake; there is no mastoid osteitis. These relapses originate from hyperplasia of the epitympanic mucosa. . . . The chief factor of chronicity is swelling of epitympanic mucosa. Simple mastoidectomy is ineffective. Radical mastoidectomy is too severe." They advise a simple atticotomy done by the endaural route in the cases where the antibiotics do not keep the infection under control. They have performed their atticotomy on 194 cases which have been followed for seven years. The per cent of cases and recurrences is not given.

Collins [14] (Aberdeen, Scotland) in his presidential address before the Section of Otology of the Royal Society of Medicine gave an admirable review of the work being done to preserve and restore hearing. He began with the condition "chronic hypertrophic eczema" of the external ear, which in several prolonged cases had produced

closure of the ear canal to a pinhole size. He treated successfully four such cases by removal of the hypertrophic skin and skin-grafting the canal. He agrees with many others that it is wrong to depend too much on penicillin alone in acute otitis media and advises opening bulging drums to prevent future hearing loss.

For the chronic suppurating ear he advises the radical mastoidectomy where the hearing is low, and agrees with Cawthorne that "if the otologist decides to do anything short of the radical mastoid operation he should be prepared to keep the patient under personal supervision." He gives full credit to Zöllner and Wüllstein for their pioneer work on tympanoplasty. He reported two "tragic" cases of Ménière's disease in which, in spite of treatment, there was rapid progress to complete deafness in both ears of each case. He urged that all avenues be explored to preserve hearing. A very well written paper, concise and comprehensive.

Houser and Dietrich [15] (Philadelphia) reviewed the indications for the different types of operations for otitis media. Preservation of hearing and prevention of chronicity are the chief aims to be kept in mind. The timeliness of surgery is the single most important factor; surgery should not be held as a last resort. In spite of the importance of doing modified radical mastoidectomies for the preservation of hearing, about 40% of the cases on which it is done will eventually require a complete radical operation.

Rambo [16] (New York) wrote an interesting article on the healing of mastoid and fenestration cavities. In the past it was assumed that when a radical mastoid cavity failed to heal in the usual time there was incomplete removal of pathology at the time of operation. But he has seen many fenestration cavities which became infected and were as slow to heal as radical mastoid cavities. As long as a cavity is healing well it should be cleaned as little as possible. However, once a cavity becomes infected, the attitude of "judicious neglect" must be given up. He selected chloramphenicol (Chloromycetin) as his antibiotic for local treatment, and used it in 657 cases of postoperative suppurative fenestration and radical mastoid cavities by dropping the powder from a 250 mg. capsule of chloramphenicol into the infected cavity. The powder was worked into the cavity with a cotton-tipped probe and left for four to six weeks. The majority of the cases cleared up after one treatment; very few needed more than three. If he suspected mycotic infection, he used Vioform cream 3% and found it very effective.

He found a few cases that developed "reflex sympathetic neuralgia," most frequently in patients whose ears had become dry after long-delayed healing. They complained of pain, dull and aching, sometimes burning, over the side of the head and neck and sometimes back of the eye. These symptoms usually cleared up a few months to a year after epithelization. His photographs of normal and abnormal tissue obtained by biopsy from postoperative cavities are excellent.

Cholesteatoma

Birrell [17] (Edinburgh) reported 21 cases of cholesteatosis in children, all of whom had some black discoloration of the mastoid cells. He quoted Simpson as believing that the black discoloration is due to small recurring hemorrhages. He found some of this discoloration in almost half of his cases. The pathological examinations showed deposits of altered blood pigment. He has been seeing an increasing number of children in whom there are repeated attacks by organisms of low virulence. On examination these children show some loss of hearing, with redness and fullness of Shrapnell's membrane. He thinks that this is frequently due to inadequate antibiotic treatment. An interesting paper.

Anderson [19] (Selly Oak, England) called attention to two findings in cholesteatoma that he considered important. The first is the sealing off of the tympanic cavity by

a false membrane. He has been able to find this membrane making an air-tight seal in 12 out of 18 cases he had done in the last year. He considered it extremely important to preserve this membrane at operation. His second finding was a continuity of the meatal epithelium with the cholesteatoma lining. He did not attempt to draw any conclusions to fit this point into any of the theories of cholesteatoma formation.

Precechtel [20] (Prague) reported five rare cases of cholesteatoma that had penetrated to the dura and enlarged as a flattened layer between the dura and the temporal bone. He had previously reported four such cases in 1945. He quotes Lundgren and others who have reported similar cases. Four of his cases had developed paralysis of the facial nerve and one had a dead labyrinth from erosion of the superior semicircular canal. He thought that absence of dizziness was due to such slow destruction of the labyrinth that it had slowly compensated. (He did not mention the probability of recurrence of these lesions because of the extreme difficulty of removing all of the pathology. Lurie [Boston] reported two similar cases in 1955 that had recurrences several years later. He considered it impossible to remove all of the cholesteatomatous material and warned his patients to expect recurrences at intervals of several years.)

Chronic Adhesive Otitis

MacNaughtan [21] (Aberdeen, Scotland) stated that chronic adhesive otitis is a major cause of deafness in about 30% of the severely deaf. He advised that great care should be taken with infants and children to arrest ear infections as soon as possible, since permanent adhesions are formed only in prolonged infections. Early paracentesis and adequate chemotherapy is important; obstructing adenoids should be removed, and, if there are recurrences of otitis, radiotherapy should be used. He quoted Ojala, who pointed out that cavities lined with mucous membrane, such as the sinuses and the Eustachian tube rarely develop adhesions except after necrotizing infections.

Cawthorne [22] (London) said that he considered chronic adhesive otitis quite rare. He thinks this is because there is no agreement as to what cases should be included under this heading. He does not include cases with perforation of the drum. His cases had a history of early hearing loss following infection. The hearing loss is of the conductive type, and the drum shows scars, opacities, chalk deposits, and, most important, impaired mobility. The appearance of the drum and the history are the main features by which he separates these cases from otosclerosis. The four cases in which he did a fenestration operation did not improve hearing. "If the stapes moves freely a fenestra should not be made; if obviously impeded, either by bone or dense fibrous tissue, then a fenestration may be tried; but, of course, an unimpeded round window is a necessary condition for success, and I think we need to pay more attention to this region." He quoted Polvogt (1936), Perlman (1943), and Lawrence (1949), and agreed with them that gross adhesive changes could be present without any great loss of hearing. He and his colleagues have done fenestration operations on 11 cases of adhesive otitis with very little improvement.

Hallpike (London) and Harrison [23] (Lincoln) at the same meeting reported a case of chronic adhesive otitis in a man of 40 who died of acute disseminated sclerosis. His tympanic membranes were normal, but tests were typical of otosclerosis. However, the microscopic examination of autopsy specimens showed definite bony fixation at the neck and posterior crus of the stapes and no fixation of the footplate. They thought this case might have been treated by stapes mobilization, and advised examination of the stapes routinely before any fenestration operation. The photograph of the specimen shows the pathology very nicely.

In the discussion which followed these three papers, Mawson (London) said that

he had operated on a typical case of adhesive otitis and found an absolutely rigid ossicular chain. The adhesions were divided, and the ossicles eventually mobilized. In doing so the incus was dislocated from the stapes. However, the incus was replaced and a 20 db. increase in hearing was obtained. (A very interesting symposium.)

Intracranial Complications

Hara [24] (Los Angeles) reported on intracranial complications of ear infections seen at the Los Angeles General Hospital (3,500 beds) over a period of 20 years, 1935 to 1954. His graphic charts showing the incidence of acute and chronic otitis media and the diminishing number of operations necessary over these 20 years are very striking. In 1955 there were only three simple mastoidectomies done in this hospital that had a total of 98,147 patients admitted. In 1936 there were 290 simple mastoidectomy operations among 62,129 admissions. The antibiotics, of course, are responsible for this remarkable improvement. However, there were 16 deaths in children under 24 months of age from intracranial complications since 1944. Almost every one of these children was seen by a general physician or pediatrician and was given antibiotics in amounts usually considered inadequate. He concluded that "one of the serious disadvantages of antibiotic therapy appears to be the masking of symptoms, particularly among children under two years of age, often leading to fatal intracranial complications."

Fletcher [25] (San Rafael, Calif.) reported a rare case of actinomycosis of the mastoid and petrous pyramid. The patient was a teamster 73 years of age. He had had an intermittent drainage from the right ear since childhood. Because of increasing pain and headache, a radical mastoidectomy was done. There were many granulations; the mastoid cavity was small, and there was very little pus. A week after operation there developed paralysis of the seventh nerve, paralysis of the right vocal cord and of the right side of the palate. A neurological consultant suggested the possibility of a malignancy of the nasopharynx. X-rays of skull and petrous pyramid were negative. At autopsy a thick rubbery, reddish-yellow mass was found surrounding the right petrous tip extending down to the foramen magnum and to the nasopharynx. Fletcher concluded: "Had we made bacteriological studies of the tissue taken for biopsy we might have made the diagnosis (actinomycosis) before death, and, as penicillin is effective in the treatment of actinomycosis, we might have saved his life."

Krajina [26] (Zagreb, Yugoslavia) presented a study on 30 cases of intracranial complications seen between the years 1948 and 1952. There were 6 cases of brain abscess, 24 of meningitis, and 4 cases of lateral sinus thrombosis. There were eight deaths. The most frequent infecting organism was the Pneumococcus. They gave penicillin by the intralumbar route, in daily doses up to 20,000 units, and doses of 1,000,000 or 2,000,000 units intramuscularly. One child 12 months old was given an intralumbar dose of 40,000 units. The child shortly afterward developed generalized convulsions and died.

Lateral Sinus Thrombosis

Reading and Schurr [27] (London), otologist and neurosurgeon at Guy's Hospital, gave a paper on thrombosis of the sigmoid sinus and its management, past and present. They comment first that many senior physicians are convinced that long before the advent of the sulfonamides there had been a progressive lessening of the virulence of the hemolytic Streptococcus. By comparison with many older reports they conclude that thrombosis of the sigmoid sinus has now become quite rare in acute mastoiditis, but remains in about the same per cent in occurrence in chronic mastoiditis. They agree that with antibiotics the patient may not have the definite picture of chills and fever that made the complication more easily recognized in the past, but that when the condition

is suspected the lateral sinus should be uncovered during the mastoid operation. They do not advise diagnostic puncture of the sinus wall, as this may produce thrombosis and also the aspirating needle would penetrate a mural thrombus and the diagnosis would be missed. Ligation of the jugular vein is rarely necessary even when there is a positive diagnosis of thrombus. They conclude: "This paper may figure almost as a memorial to a disease that is now nearly extinct in its original form but still appears occasionally so disguised that it is not so easily recognizable by the otologist. An obituary always implies a decent degree of regret, and it is possible that a pang of emotion may be felt at the virtual disappearance of a disease so dangerous, yet calling on all the powers of decision, resolution, and dexterity that a surgeon can exercise." (A very readable paper.)

Berkman [28] (Ankara, Turkey) reported six cases of thrombosis of the lateral sinus in whom anticoagulant therapy, either ethyl biscoumacetate or heparin, was used with apparently very good results. His second case ran a prolonged septic course with severe chest involvment, probably embolic. Ligation of the internal jugular vein was done, and infected thrombus was traced deep into the lower neck. The other five cases were also very toxic and ran stormy courses. Penicillin, sulfonamides, and sometimes oxytetracyline were given (amounts not reported). Several times during treatment of three of the cases, stoppage of the anticoagulant was followed by rise in temperature, and on resumption of the anticoagulant the temperature would drop. He reasoned that "anticoagulants while reducing the tendency to thrombosis, dissolve it and expose the concealed organisms to the effect of antibiotics." Five of the six cases had removal of the thrombus, and only one of the five required ligation of the jugular vein. One case did not have the thrombus removed, and at a second operation, done because of chills and fever, an epidural abscess was found and puncture of the lateral sinus that had previously found no blood then showed that the previously present thrombus had disappeared.

Meningitis

McBean [29] (Rochester, Minn.) gave a review of 15 cases of otitic meningitis seen at the Mayo Clinic from 1946 through 1955. There were six deaths, 40%, all in cases with acute otitis media. In the five cases in which they were able to identify the organism, it was the Pneumococcus. All cases resulting from chronic otitis media recovered, after radical mastoidectomy. Four of the fatal cases were admitted late in the disease and died on the same day, before adequate treatment could take effect. He concludes that otitic meningitis is an extremely serious complication, and that in order for treatment to be effective the diagnosis should be made early and treatment should consist of very large doses of the antibiotics.

Brain Abcess

Morse [30] (Knoxville, Tenn.) reported three cases of intracranial complications, one sinus thrombosis and two of brain abscess. One of the cases of brain abscess had almost complete destruction of the temporal lobe after only a short duration of symptoms. He recovered after radical mastoidectomy and drainage of the abscess. Morse urges prevention as the best treatment for these complications. Early surgery for chronic suppurative otitis is advised, even in the presence of negative x-ray findings.

Otitic Hydrocephalus

Barnes [31] (Inglewood, Calif.) wrote an interesting paper on otitic hydrocephalus and reported a case occurring in a boy 6 years of age. The onset of symptoms of intracranial pressure came on three weeks after an acute otitis media. Mastoidectomy showed very little pathology, and no disease of the lateral sinus was found. In spite of careful neurological observation and treat-

ment at the Children's Hospital of Los Angeles, the intracranial pressure finally caused optic atrophy and complete blindness. It had been impossible to keep the intracranial pressure down by spinal taps alone, and spinoperitoneal anastomosis was done to establish continuous drainage of spinal fluid. The onset and course of the symptoms in this case were so vague that the diagnosis remained in doubt during the entire course of observation and treatment. Barnes' review of the literature is most thorough, and his discussion of symptoms, diagnosis and treatment should be studied by those interested. He urges that slight symptoms, such as lethargy, dizzy spells, and blurring of vision, should be watched for in our otitis media and mastoid patients, and at each visit the eye grounds should be checked with the opthalmoscope—since the most important finding in the diagnosis is papilledema. "Energetic treatment, particularly daily spinal taps, may prevent ultimate blindness."

Baer [32] (New York) reported the unusual case of an 11-year-old girl that developed otitic hydrocephalus following acute mastoiditis. The ear had drained spontaneously on the fifth day of pain; three days later she began to have vomiting, dizziness, and double vision with blurring. Simple mastoidectomy was done, and there was much necrosis of the cell walls. The lateral sinus was exposed and found to be covered with grayish granulations. After operation there were more symptoms of intracranial pressure, and the spinal tap showed a pressure of 320 mm. of water. The pressure was kept down by frequent spinal taps until the 15th day. The recovery was more rapid than in most reported cases, and there was no residual damage to the eyes. They agree with Symonds and others that the probable cause of the high prolonged intracranial pressure is thrombosis of the superior longitudinal sinus, spreading to the arachnoid villi by phlebitis, and in this way impeding absorption of cerebrospinal fluid.

Serous Otitis

Singleton [33] (Dallas, Texas) has found that serous otitis media is a common disease, the diagnosis of which is frequently missed. He found that the cases which came as the result of acute infection cleared up easily and that if the course of the disease was prolonged the cause was most frequently some form of allergy. Myringotomy followed by Politzer inflation is his treatment of choice, to be followed by autoinflation by the patient at home. He urged that a careful examination for the underlying cause be made and that, where possible, the cause be removed.

Juers [34] (Louisville, Ky.) described his "myringostapediopexy" and illustrated it with clear diagrams. He is seeing more cases of chronic ear disease with attic perforations, while the acute cases have become rarer. Prophylaxis against chronic otitis media includes follow-up of all acute cases to make sure that antibiotic treatment has continued until all exudate has cleared up and the exudate within the middle ear has cleared up completely. In this way many later chronic cases can be prevented. (The details of his method of turning a flap of the skin from the meatus over into the postoperative attic cavity should be studied in his article, which is concise and clear.)

Technique

Andrew [35] (Duluth, Minn.) advises a type of operation for small attic cholesteatomas which leaves no mastoid cavity. He uses the incision advised by Shambaugh, dissects out the cholesteatoma sac after removing the bony cortex, and closes the incision completely. This type of operation is limited to the cases with no involvement of the middle ear and those where complete removal of the disease tissue is assured. He has done 25 cases with this technique and has had no recurrences so far. The advantages are quicker healing, less pain, no mastoid cavity requiring postoperative care, and improvement of hearing when the ossicular chain remains intact.

Withers [36] (Houston, Texas) advises immediate skin grafting of his mastoidectomy and fenestration cavities. He reports results in 33 cases in addition to 46 cases reported in 1952. He reports that his grafted mastoid cavities are dry and healed in an average of 8.6 weeks as contrasted with 25.6 weeks in his previously reported ungrafted control group. In fenestration and modified radical mastoid cavities 4.2 and 6.5 weeks contrasted with the usual 12, 16, or 17 weeks reported by other authors.

Proud [37] (Kansas City) described a method of operation for stricture of the external auditory canal, reporting six cases of acquired complete stenosis. His first incision begins like Lempert's first endaural incision, and is extended down just anterior to the location of the stenosed canal. The second incision extends backward at right angles to the first and across the stenosed meatus. Two flaps are then dissected out and underlying scar tissue removed. Five of the six cases had much infection in the middle ears and mastoids. This pathology was removed in the usual endaural manner. The flaps were then turned in and held in place by sutures passing through and out behind the ear resembling "the one used by Sooy to maintain patency of the meatus in the fenestration operation." The mastoid and middle ear cavities were skin-grafted. All six cases maintained patent canals, but only one case had improvement of hearing; the other five had extensive middle ear disease.

Bauer [38] (Liverpool) discussed the problems of stenosis of the auditory meatus after endaural ear operations. He quotes a number of authors who use the Lempert incision and various modifications. Most of them mentioned that there are from 1% up to as high as 25% of their cases who develop stenosis of the canal postoperatively. He suggests that the first incision be made between the tragus and the helix, according to Lempert. The second incision should be deep inside the meatus. The flap is mobilized by a third incision backward and downward. The flap is elevated and everted outward during the operation, thus giving better exposure of the middle ear structures from the start of the operation. After the operation the flap is turned inward without thinning or suturing. He has done 44 cases by this method and has had no stenosis.

Daggett [39] (London) reported the case of a boy of 11 years who was operated upon for cholesteatoma. There was an extension of cholesteatoma behind the body of the incus, and during its removal the short process was dislocated. After removal of all disease the incus was placed back in position, and 15 weeks after operation the audiogram showed normal hearing.

Wright [40] (Houston, Texas) described his method of closing central perforations of the eardrum. In patients that came for a long-continued series of treatments at weekly intervals he obtained healing of the perforation some of them quite large in 88% of a series of 65. He uses 50% trichloracetic acid applied to the entire edge of the perforation. The applicator should be thin and should be tipped with cotton about 1 mm. in diameter. The edge of the perforation is painted for a distance of about 1 mm. Then a thin cotton patch is packed down against the drum and kept moist continuously with neomycin drops, two drops twice daily. Most of these patients were healed in two or three months; some came as long as one to two years.

For those patients that preferred a quicker result, he did 70 skin grafts on 56 perforated drums; 57% were successful on the first attempt; 9 of 14 regrafts were successful, making a total of 71% of the 56 cases. These patients have been followed from three months to three years, one of them having tolerated four myringotomies through the graft for active suppurative otitis media. The technique of the grafting should be studied in the original paper by those interested.

Mowat and Higgins [41] (Bolton, England) describe the manufacture and use of small plastic balloons which they use in dressing

their radical, modified radical, and fenestration cavities. The inserts are prepared by heating plastic tubing over a small flame until soft, then blowing up into balloons about 3 cm. in diameter. These are left in the mastoid cavities three weeks, gauze packing being changed through the neck of the balloon when necessary. They state that their use makes dressings painless; granulations are much less frequent, and cavities dry sooner. Their photographs are clear and make the procedure quite simple.

They did eight skin grafts of cavities using the balloon technique and gave up grafting, as healing was faster without grafts.

External Otitis

Reiss [42] (New York) reported on 44 cases of external otitis cases seen in private practice and at the Manhattan Eye, Ear and Throat Hospital. He tested the bactericidal and fungicidal property of cerumen. He added an ether-acetone extract of ear wax to blood agar in 5% and 50% concentrations. Plates were inoculated with Pseudomonas, Staphylococcus aureus, hemolytic Streptococcus, and Escherichia coli. Growth was as heavy as in the control plates. Many observers have noted the lack of wax in external otitis. The reason for this is not yet clear. He believes that the isolated micro-organisms are secondary invaders; the primary cause is some qualitative or quantitative imbalance of the sebaceous, and, particularly, ceruminous glands. He found that the bacterial flora did not decrease during treatment with the corticosteroids despite the fact that itching and exudation stopped 48 hours after the medication was given by mouth or applied locally. He has also got good results by increasing the acidity in the ear canal; in five cases he used 1% hydrocortisone and Burow's solution 3% in Polysorb ointment. He has tried many combinations of the corticosteroids and antibiotics and apparently has no favorite, having seen no sensitization reactions and having obtained good results with them all.

McLaurin [43] (Baton Rouge, La.) has advised the use of a silicone solution to protect the external ear canal from the irritation of water, especially in swimmers. This is a preparation from the Dow Corning Corporation called Dow Corning 200 Fluid (viscosity 500). He has found it to be nonirritating in the rabbit's cornea, and has been prescribing it for two years for patients susceptible to attacks of external otitis. He has his patients use a few drops in the ear canals about every third day during the time the ear is to be exposed to excessive moisture. He also emphasized the importance of avoidance of trauma as in scratching. Treatment of the infective flare-ups requires careful cleansing, compresses with Burow's solution during the acute stage, and later the application of a hydrocortisone ointment or an antibiotic mixed with boric acid powder. He finds "Selsun" (a selenium shampoo) excellent for controlling seborrhoea of the scalp where this is present and contributing to external otitis.

Perry and Nichols [44] (Philadelphia) cultured the organisms in the ear canals of 90 normal persons. They found the normal flora to be micrococci and Corynebacteria. There were very few streptococci or Pseudomonas organisms. They implanted large numbers of Pseudomonas aeruginosa organisms in the canals of seven healthy volunteers. No infection occurred, and a week later the organisms could not be cultured.

They then tried adding normal cerumen to broth and agar culture media and found that cerumen did not inhibit the growth of any organisms. This agreed with tests run by Creed and Negus in 1926 that there is no actual bacteriocidal power in cerumen. They concluded that other factors, such as heat, humidity, and trauma, must be necessary to produce otitis externa as well as the presence of Pseudomonas or other organisms.

Senturia and Liebmann [45] (St. Louis) have continued their extensive work on external otitis and have been experimenting

with cats. It was found that it is possible to reproduce external otitis in these animals. It was necessary to combine several factors: inoculation with Pseudomonas, removal of wax, and infliction of trauma. High temperature and elevated humidity alone or in combination did not produce external otitis. Heat and high humidity did not increase the degree of inflammation produced by the first three factors.

Branca [46] (Fort Pierce, Fla.) has kept a month by month record of incidence of external otitis for the past four years. The month of greatest incidence is August each year, the cases building up and subsiding in the same way as the weather becomes hotter and then cooler. This agrees with many others, one of whom called it the "hot weather ear." He thinks that the atrophy of the ceruminous glands may be the primary cause; dryness produces itching, and scratching starts infection. He is puzzled as to why some cases remain so chronic, and have so many recurrences after apparent cure. He has lately had excellent results with the cortisone preparations and the antibiotics polymyxin, neomycin, and sometimes chloramphenicol (Chloromycetin). He has had excellent results with 10% boric acid ointment used frequently as a preventive, especially before and after swimming. He also uses staphylococcic toxoid in some cases. Cortisporin, a Burroughs-Wellcome preparation "was surprisingly beneficial in old cases of external otitis."

Lees [47] (Glasgow) reports very good results in treating 70 ears (63 patients) with external otitis and infections of radical mastoid cavities using neomycin-hydrocortisone acetate ointment. He reported cures within a week in 90% of his cases. Half of the cases had resisted other forms of treatment. "The response to treatment of infected radical mastoid cavities was surprisingly good. Raw areas showed fairly rapid healing."

Miscellaneous

Everberg [48] (Copenhagen) reported the case of a 15-month-old girl in whom histiocytosis produced a large mass in the left temporal region. The initial diagnosis was meningocele. The mass was removed, and the microscopic examination showed typical cells of histiocytosis. The child improved but later developed similar swellings of the inguinal lymph nodes, liver, and spleen, and died after 20 months of illness in spite of x-ray treatment. The case was classified as Letterer-Siwe disease. This form of histiocytosis is usually more rapidly fatal. Eosinophilic granuloma and Hand-Schüller-Christian disease are the other two recognized forms of histiocytosis and should be kept in mind by the otologist since the first symptom may frequently be a swelling in the mastoid region resembling a subperiosteal abscess. The etiology is unknown; antibiotics are useless, but x-ray treatment is usually highly effective.

Graf [49] (Zurich) reported the unusual case of a spontaneous pneumatocele of the mastoid. Search of the literature revealed 23 cases reported since 1907. The patient was 18 years old, and the large air-filled sac in the right occipital region measured about 5 in. in diameter. There was no history of any ear infection, no pain, and the x-ray showed no infection. No infection was found at operation. He assumed that there must have been a persistent defect in the petrosquamosal suture which allowed air from the mastoid to be transmitted to the sac, possibly from pressure through the Eustachian tube. The patient remained normal when seen six months after operation.

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Abstracts from Current Literature

Ear

Early Experiences of the Plastic Surgery of the Sound Conducting Apparatus with Report of 57 Consecutive Cases. Philip H. Beales, J. Laryng. & Otol. 71:162-174 (March) 1957.

The author briefly reviews the history of surgery for the closure of tympanic membrane perforations and presents some of the ideas of Wüllstein and of Zollner on the subject of tympanoplasty. He describes his technique for the closure of central perforations by the use of a postauricular thinned full-thickness skin graft laid over a bed of the de-epithelized remaining tympanic membrane and adjacent ear canal; the importance of an adequate bed is stressed. He advocates such a procedure without opening the temporal bone in selected cases, a procedure condemned by Wüllstein. He gives results in 17 myringoplasties. The hearing was improved in 70%, and most ears were dry in a few weeks. He does not present his cases of tympanoplasty in this article.

Lewis and LeJeune, New Orleans.

Early Experiences of the Plastic Surgery of the Sound Conducting Apparatus with Report of 57 Consecutive Cases. Part II. Philip H. Beales, J. Laryng. & Otol. 71:297-312 (May) 1957.

This second paper deals with the author's experience in the treatment of 42 cases of active chronic suppurative otitis media by reconstructive surgery. Wüllstein's classification is used in the discussion. Interesting findings are presented in a tympanoplasty graft removed six months later. The graft survived as skin in the middle ear, and its under surface became lined with mucous membrane in the mastoid bowl. The graft atrophied and retained no specialized elements. He advocates culture and sensitivity tests on the exudate, brief preparation, local and systemic therapy with appropriate antibiotics, and prolonged postoperative therapy.

His technique is postauricular and follows Wüllstein's. He considers use of the acoustic probe unnecessary since one can inspect the ossicular chain at operation. He points out that, if the posterior half of the drum is to be reflected forward for inspection of the window regions, it is easier to de-epithelize the drum first. If the perforation is small, no gelatin is placed in the middle ear, and if large it is used. If the bridge is removed, the incus should also be removed as graft adhesions will fill it. Postoperatively inflation of the Eustachian tube is not performed for one month. Healing in his patients was more rapid and complete in the middle ear than in the mastoid bowl. Documented cases are presented and show best functional results in Types 3 and 4 tympanoplasties. He feels the results in these procedures are superior to the radical mastoid operation and safer than the modified radical operation.

This is an excellent article to be read in its entirety by those interested in this work. It is encouraging to find the principles and teachings of Professor Wüllstein applied by otologists in other countries and the same excellent results being reported.

Lewis and LeJeune, New Orleans.

Idiopathic Hemotympanum: Review of the Literature and Report of Three Cases. James L. Sheehy and Byron G. McKibben, Laryngoscope 66:1291 (Oct.) 1956.

Only 14 cases of idiopathic hemotympanum have been so far reported. The protusion of the jugular bulb into the middle ear and certain cases of secretory otitis also may present a bluish cast to the eardrum, but these cases cannot be included under the term idiopathic hemotypanum.

There may be pain, hearing loss, or discharge. The eardrum is bluish-black in color, and in most cases there is a patent Eustachian tube. The fluid in the middle ear is reddish-brown, chocolate-like, and fairly thick. This is the most important diagnostic point.

Mastoid x-rays will show some clouding and occasionally bone destruction.

The obvious treatment, tubal inflation, and myringotomies gave unsatisfactory results in the five reported cases in which it was used. Four cases were subjected to simple mastoidectomy.

A sterile brown fluid and granulation tissue were found in the mastoid cells. Three of the four cases were cured. The fourth persisted in forming fluid but had a marked improvement. The etiology of this condition is not known.

To the reviewer there is a similarity between this condition and secretory otitis media.

HITSCHLER, Philadelphia.

CONDUCTIVE DEAFNESS DUE TO PYLE'S DISEASE. WILLIAM H. SAUNDERS, Laryngoscope 67:147 (Feb.) 1957.

In this day of intense interest in otosclerosis and its surgical remedies, the report of a conductive deafness due to an entirely different bone dyscrasia is noteworthy.

Metaphyseal dysplasia, or Pyle's disease, was first described in 1931. X-rays show a splayed conformation of the long bones. The cause is unknown. Three cases are presented with deafness as the presenting symptom, the only ones so reported. The deafness was of the conductive type, not unlike that found in otosclerosis. The facial and skull bones also showed changes. Fixation of the stapes was the probable, though unproved, cause of the deafness. No therapy has been attempted with any of these patients

HITSCHLER, Philadelphia.

BLUE EARDRUM. JENS G. HALL, Acta oto-laryng. 47:245 (March) 1957.

Blue eardrum is described as a concomitant of various diseases, including inter alia hemangioma of the middle ear, injuries, varices, hemophilia and jugular vein bulging up into the middle ear. The idiopathic type has been described but only rarely by a few authors. The treatment is myringotomy and suction. In some instances mastoidectomy has been performed, and the cells of the mastoid have been found to contain a brownish fluid.

The author reviews the present literature and reports one new case, in which the source of bleeding seems to be in the mastoid process.

LEWY, Chicago.

DEAFNESS AMONG AVIATORS AND ITS PROFESSIONAL CONSEQUENCES. A. MASPÉTIOL, A. ROBERT, and D. SEMETTE, Ann. oto-laryng. 73:799 (Oct.-Nov.) 1956.

The authors outline two types of deafness among aviators, one due to barometric changes and the second due to sound traumatism.

In the second category, the described 3 degrees of deafness: (1) At the 4000 frequency level and at times the 3000, there may be a loss from 30 to 70 db.; (2) a hearing loss may extend to the 2000 frequency, and (3) the hearing loss may involve the 1000 level.

The important feature of the hearing loss is its influence on intelligibility. Where the hearing loss involves the higher frequencies, the intelligibility is usually not involved. However, where the hearing loss involves the 2000 or even at times the 3000 level, intelligibility is definitely affected.

Deafness due to barometric changes is usually reversible in the early stages, but becomes a permanent condition after many years. It is a frequent occurrence and very insidious in onset and may be present for a long time. In the later stages, intelligibility is also affected.

Because of this effect on intelligibility in both categories, there is a great hazard, since proper interpretation of radio messages may be affected. Careful screening of all aviators must be made at all times.

PERSKY, Philadelphia.

THE VALUE OF INTELLIGIBILITY AT THE VARIOUS FREQUENCIES. A. MASPÉTIOL, A. ROBERT, and D. SEMETTE, Ann. oto-laryng. 73:812 (Oct.-Nov.) 1956.

The authors conducted a series of experiments to determine the value of intelligibility at the various frequencies. There were three experiments (*a*) a masculine voice with changes at ⅓ octave; (*b*) a masculine voice at changes of ½ octave, and (*c*) a feminine voice at changes of ⅓ octave. Their results show that with male voices (1) the optimum intelligibility is at 1263 (136); (2) 3000 and 4000 frequencies are situated below the level of conversational perception, and (3) 500 and 750 have a high coefficient of intelligibility. With the female voice, there is a slight shift to a little higher frequency. The authors give the following approximate coefficients:

Frequency	500	750	1000	1500	2000
	10%	15%	25%	30%	20%

To calculate the hearing loss in decibels, they multiply the audiometric hearing loss of the above frequencies by the coefficient of intelligibility, add the various values, and divide by 100.

PERSKY, Philadelphia.

DEGENERATION OF THE ENDOLYMPHATIC LABYRINTH. S. YAKUSHIJI, J. Oto-Rhino-Laryng. Soc. Japan 58:614-620, 1955.

Intractable cases of unilateral Ménière's syndrome have been treated by various surgical techniques. Among these are the following:

1. Dandy (1941)—resection of the vestibular nerve from the external approach
2. Day (1943)—electric destruction of the vestibular contents
3. Cawthorne (1943)—destruction of the labyrinth
4. Injection of alcohol into the vestibule and semicircular canals
5. Portmann (1927)—drainage of the endolymphatic sac
6. Lempert (1948)—decompression of the labyrinth by removal of stapes and the round window

The author made a histological study of the inner ear after Lempert's operation was performed on cats, and found the following:

1. After one week the change was limited to disappearance of the outer hair cells from the third turn of Corti's organ. The other structures in the cochlea remained the same as in normal animals.

2. Two weeks after, the outer hair cells of the first half of the first turn and the whole of the third turn were found to have disappeared.

3. Four weeks later the scala tympani near the round window was filled with fibroblastic proliferations, with calcification in places, and the round and oval windows were already repaired. The outer hair cells and Deiter's cells of the beginning of the first turn were lost. In the other part of the turns, however, Deiter's cells were retained, although the outer hair cells were almost lost.

4. No changes were found in the sensory cell of the vestibule.

HARA, Los Angeles.

ARTIFICIAL TYMPANUM. P. ZDRAVEV, M. PORTMANN, G. CLAVERIE, and P. GRUMALDI, Rev. Laryng. 77:865 (Sept.-Oct.) 1956.

The authors discuss the various prostheses that have been used to close a tympanic perforation. Some of the indications for their use are a dry middle ear with absence of cholesteatoma. Contraindications are a progressive osteitis or a myringitis. Tubal obstruction, cicatricial processes in the middle ear with ankylosis of the ossicles, or obstruction of the round window are also contra-indications for the artificial tympanum.

Closure of a perforation may be affected by (1) cauterization (trichloroacetic acid, chromic acid lead, or strong silver nitrate solution); (2) inert material such as (*a*) cotton saturated with glycerin, paraffin oil, or a 5% solution of panthenol, (*b*) cigarette paper; (*c*) cellophane, (*d*) gold leaf, (*e*) plastic material such as polyvinyl or polythene; (3) biological material such as mesentery of sheep or amniotic membrane, and finally (4) homografts, e. g., tympanoplasty.

The authors prefer the polyvinyl method in the most of their central perforations. Trichloroacetic acid should not be used for small perforations.

PERSKY, Philadelphia.

Larynx

THE CLINICAL SIGNIFICANCE OF THE RAMIFICATION OF THE RECURRENT NERVES. H. PICHLER and A. GISEL, Laryngoscope 46:105 (Feb.) 1957.

Paralyses of the vocal cords resulting from surgery have not as yet been satisfactorily explained either anatomically or physiologically. Not enough emphasis has been placed upon the fact that the recurrent nerve usually divides extralaryngeally. This was found by the authors in 78% of 28 cadavers. King and Gregg explained the various palsies in terms of a high or low division of the nerve. They assume that there is a posterior motor ramus as well as an anterior motor ramus, and that the resultant paralyses depend upon which of the rami, or if the main nerve itself, is injured. Pichler and Gisel's dissections indicate that the posterior ramus was not a motor nerve innervating the posticus but a mere mucous nerve of the hypopharynx. Also it was shown that the real motor nerve of the posticus was

given off endolaryngeally, only the sensory fibers dividing extralaryngeally. Hence it is concluded that the complete explanation of the different palsies encountered in neck surgery is not known.

HITSCHLER, Philadelphia.

USE OF ENDOTRACHEAL TUBES AND CARDIAC ARREST. MEREL H. HARMEL, New York J. Med. 57:1647 (May 1) 1957.

A previous article on "Death in the Operating Room," published in the State Journal on Jan. 15, 1957, aroused a challenging letter from Dr. Alan A. Kane, of Brooklyn, who said: ". . . A sudden uncontrolled pneuomothorax adds a severe insult to the heart which is the seat of an acute coronary thrombosis. Failure of resuscitation will ensue." To this statement Dr. Harmel aims to make an effective answer. He states that in the original report, the patient, although cyanotic, continued to breathe, and that competent trained personnel should be available for observing the status of patients. In the case under discussion the heart was at standstill when the chest was opened. Harmel does not accept the thought than an endotracheal tube is essential to the prevention of pneumothorax. He says: "Adequate ventilation in the presence of an open chest can be carried out without an endotracheal tube." Moreover, he refers to a surgical clinic in Chicago where this was common practice. One has little or no time to lose, since four minutes or less marks the margin between life and death. Artificial respiration should proceed while the chest is being readied for surgery. Mouth to mouth insufflation, as is done in obstetrical emergencies, should be tried as a supplementary measure. The mask and bag lead in importance. "Usual causes of cardiac arrest in the operating room are anoxia or carbon dioxide excess or both, anesthetic overdose, and blood loss. The question which Dr. Kane has raised must be answered unequivocally in favor of mask and bag."

I. W. VOORHEES, New York.

SAFE SIMPLIFIED TECHNIQUE FOR ESOPHAGOSCOPY. DAVID SHEPARD, New York J. Med. 57:1921 (June 1) 1957.

Shepard thinks that the hazards of esophagoscopy are well known, but, perhaps, not well enough emphasized. Quoting Schindler, it is stated that "there is a morbidity of 2 per cent, and a mortality of 0.5 per cent." The rise would be larger for nonexperts. The area of danger is "the cricopharyngeal stopcock" because it is so easy to make a tear into the mediastinum. A little too much force here will perforate the posterior wall of the esophagus.

A case history is presented: A 3-year-old Negro child had a foreign body in the esophagus. The anesthetist would not give general anesthesia; therefore barbiturates were used freely without anesthesia. A spasm at the cricopharyngeus did not permit entrance into the esophagus, after two attempts. Then a soft rubber catheter was passed through the nose and into the esophagus as a guide. It was seen at the distal end of the tube. The spasm was no longer an obstacle, and so without undue effort the scope was passed anterior to the catheter which is rigid technique in this maneuver. The foreign body was removed readily; the catheter was withdrawn; there was no unpleasant sequela. This procedure is "well suited to those surgeons who perform endoscopic visualization of the esophagus only occasionally." The author characterizes it as "a safe and simple method."

I. W. VOORHEES, New York.

CARCINOMA OF THE INTRINSIC LARYNX. F. C. MARCHETTA, W. T. MAXWELL, H. C. RIEGLER, and R. SCHOBINGER, Surg. Gynec. & Obst. 104:401-406 (April) 1957.

This report contains an analysis of 158 documented cases of intrinsic carcinoma of the larynx treated at the Roswell Park Memorial Institute, Buffalo, during the years 1935 through 1953. The classification used is an unfamiliar one and there is no bibliography to indicate the authors' awareness of the currently accepted methods of choice in the therapy of laryngeal carcinoma. This is further borne out by an unusual reliance upon irradiation therapy for lesions associated with fixation of the vocal cords, extension to the ventricular bands, or clinically palpable metastatic nodes. Proponents of the surgical treatment for most forms of larynx cancer will find much support in the discouraging results of irradiation therapy herein presented, including the 10% over-all incidence of radionecrosis. It is regrettable that a more representative article on the current therapy of laryngeal carcinoma has not been presented to readers of the journal in which this article appears.

FRIEDBERG, Chicago.

CONGENITAL ATRESIA OF THE ESOPHAGUS WITH TRACHEO-ESOPHAGEAL FISTULA. A. DE BOER and W. J. POTTS, Surg. Gynec. & Obst. 104:475-484 (April) 1957.

The surgical repair of congenital atresia of the esophagus with tracheoesophageal fistula forms the basis for this analysis of 113 cases in which operation was performed. Excellent roentgenograms illustrate some of the associated diagnostic problems. The operative procedure is well depicted. Detailed attention to persistent and methodical preoperative removal of secretions from the nose and throat, endotracheal anesthesia, transpleural operation, a two-layer suture anastomosis, instruction to residents and nurses on the importance of maintaining a clear airway and of slow postoperative feeding with a medicine dropper, and early diagnosis are the items emphasized in the improved methods of treatment outlined by the authors.

FRIEDBERG, Chicago.

CERVICAL METASTASIS FROM OCCULT CARCINOMA. M. S. COMESS, O. M. BEAHRS, and M. B. DOCKERTY, Surg. Gynec. & Obst. 104:607-617 (May) 1957.

From 1945 to 1954 there were 1189 patients seen at the Mayo Clinic with a diagnosis of metastatic carcinoma of the cervical lymph nodes. Of the entire group, 814 patients (69%) had primary lesions in structures of the head and neck, 76 (6%) in the skin of the head, neck, or upper part of the thorax and 196 (16%) in thoracic and abdominal viscera. In the remaining 103 patients (9%) primary lesions were not evident. Follow-up studies were possible in 100 of these 103 patients and in 42 patients the primary tumor subsequently became apparent.

The thyroid gland was the site of the largest number of cryptic primary lesions (11 cases), the nasopharynx ultimately proved to be the primary site in 7 patients and the faucial tonsil in 5 patients. The floor of the mouth, the external auditory canal, esophagus, and larynx proved to be the source of the primary lesion in other cases, while lesions below the clavicles metastasizing to cervical nodes were discovered in nine patients.

Sixteen patients with unknown primary lesions underwent treatment for their metastatic disease (principally surgical) and have remained well without evidence of a primary tumor for 1½ to 11 years after initial examination.

In 42 instances the primary source of the metastatic cervical lesion was not discovered during life, and, with one exception, necropsy was not done.

It is concluded that a small number of squamous-cell carcinomas possibly may be primary in the deep tissues of the neck, as shown by long survivorship without evidence of a primary source after varying or no treatment. Such a diagnosis can be made only in retrospect. The unpredictable course of malignant tumors may be the explanation.

All indeterminate cervical masses should be explored surgically after intensive clinical examination, with precautions to allow definitive surgical treatment at the same time or later if indicated.

FRIEDBERG, Chicago.

OBSERVATIONS ON THE DESTRUCTION OF THE LARYNGEAL HYALINE CARTILAGES IN CANCER OF THE LARYNX. SHOZO HIRAOKA, Otol. Fukuoka 3:17-40 (March) 1957.

The laryngeal hyaline cartilages were found broken down in 51 out of 170 cases of cancer of the larynx observed at the Fukuoka Medical College Clinic. The author made the following observations:

1. There was destruction of the thyroid cartilage in 40 cases, the cricoid in 20 cases, and the arytenoid in 12 cases. In 11 cases both the thyroid and the cricoid were affected.

2. The breakdown occurred most frequently in subglottic cancer (42.9%) and less frequently in endolaryngeal (38.7%), extrinsic (31.9%), and intrinsic growths (11.8%).

3. The perichondrium played a distinct role in the prevention of the spread of the growth. The ossified part of the cartilage appeared to be particularly vulnerable.

4. The lower segment of the thyroid cartilage and the upper segment of the cricoid were the most frequent sites of destruction. The upper part of the thyroid, the vocal process of the arytenoid, the base of the arytenoid, and the upper part of the arytenoid were predisposed to cartilaginous destruction, in the descending order named. These areas undergo the earliest ossification.

5. Except in rare cases the type of tumor did not appear to be a factor in the process of degeneration.

6. Cervical (81.8%) and prelaryngeal (45.5%) lymph-node spread occurred most frequently in those in which both the thyroid and cricoid cartilages were involved in destruction. The endolaryngeal tumors brought about the highest incidence of cartilaginous destruction.

7. The cartilage destruction was rarely related to the hypopharyngeal or pre-epiglottic spread of the tumor.

8. There was no metastasis in intrinsic carcinoma, nor was there any postoperative death, regardless of the integrity of the laryngeal cartilage.

9. The final outcome in endolaryngeal cancer was much more grave when there was cartilage destruction.

10. Alteration of voice in cancer of the larynx is attributable to the cordal infiltration rather than to the invasion of the arytenoid area.

HARA, Los Angeles.

Miscellaneous

INFECTIOUS ASPECTS OF ASTHMA IN CHILDREN. ROBERT CHOBOT, New York J. Med. 57:1644 (May 1) 1957.

Chobot is an allergist who believes that respiratory infections are competent producing causes of asthma. His opponents say that proof is absent, in that positive skin tests to bacteria are lacking, as are skin-sensitizing antibodies in the blood, but Chobot counters with the statement that clinical sensitivity to certain foods exists also in the absence of such positivity! He thinks that "medical opinion is coming to accept the existence of bacterial allergy." Familial history may throw light on individual idiosyncrasies. "The foci of infection in children are most often in the tonsils and adenoids." Commonly found are hemolytic streptococci, pneumococci, and hemolytic staphylococci. A relatively high eosinophil blood count is common. Chobot and Uvitsky have published a study of 400 asthmatic children. (*J. Allergy* 22:106, 1951.) Other factors, such as foods, were *particeps criminis*, but bacterial allergy seems paramount.

As for therapy, medical treatment plus antibiotics should be used before surgical removal of foci. . . "The importance of early removal of infected tonsils and adenoids cannot be overemphasized." But he warns against finger palpation of the nasopharynx in children, which is painful and inaccurate. [One may add, and frightening to the patient.] Prompt treatment of "sinus colds" in children may forfend both asthma and urgent surgery at a later time. Autogenous vaccines are useful plus irrigations. Radium to the nasopharynx, also x-ray, may be useful.

After infective foci have been removed, Chobot advises autogenous vaccines in preference to stock vaccines. Cultures are taken from nose, mouth, throat, and lower sources—sputum. This especially under age 18 months, which is considered "too young for surgery." The author, however, puts 18 months as a sort of dividing line, and recommends A. and T. surgery after that age as a help in preventing chronic conditions. Colds are "taken" from some one who has them; therefore nursemaids and family members should be isolated from children if these adults are undergoing respiratory infection. Sulfadiazine is recommended since it is usually well tolerated by children, with the possible undesirable skin effects—hives and dermatitis. "Blood counts and urinalysis should be done every two weeks." During an attack of asthma, epinephrine in dose of 0.1 to 0.3 cc. is helpful. It is better to give small doses of this agent at frequent intervals than large doses which may induce tremor, pallor, and nausea. Ephedrine in 15 to 20 drops as a 3% aqueous solution can be given orally. Iodides are old, well-established items, and are helpful where secretion from the lower airways is scanty. Aminophylline in suppository form, 1½ to 3 grains (0.1 to 0.2 gm.) is adequate for liquefying secretions. Aspirin is out, because of untoward reactions, even death. Adrenocortical hormones may be of value in controlling a severe attack, but should be used sparingly, and never for long periods of administration.

Abstracter's Comment:

This is a short, concise well-considered essay based on experience, and agrees completely with the observations of many ENT men. My thought is all against radium in the nasopharynx in spite of its advocacy by eminent authorities. Adenoid tissue is easily crushed and removed, under complete anesthesia, of course, and a child may thus be taken out of classes

for the deaf into the schoolrooms for "normal children". Preparing vaccines by heat is outmoded by many pathologists since chemical changes may occur. Some agent like formalin derivatives is preferred.

I. W. VORHEES, New York.

OBSTRUCTING LESIONS OF UPPER RESPIRATORY TRACT: PROBLEM IN ANESTHETIC MANAGEMENT. MEREL H. HARMEL, New York J. Med. 57:1791 (May 15) 1957.

Harmel is Chairman of the Anesthesia Study Committee of the New York State Society of Anesthesiologists. The conferences have been considering medical emergencies, particularly the causes of death in operating rooms. During operations about head and neck co-operation with the surgeon is paramount. "Anesthesia should never be started unless the patency of the airways has been assured." A case is reported of a man of 65 who was under operation for carcinoma of the nasopharynx. He was breathing poorly at the beginning of surgery, which was for emergency relief. A hurried tracheostomy was ineffective, and the patient died forthwith. The author criticizes the anesthetic management. He says: "It is a grave error in this circumstance to employ sedation, since . . . effect on the respiratory mechanism may make the hypoxia or asphyxia worse." Atropine, however, may be allowed to prevent the accumulation of secretions. Adequate ventilation must be obtained by balancing the inflow of oxygen and the removal of carbon dioxide. Intubation is desirable, provided pieces of friable material do not break off and further complicate the procedure. Merkel recommends preliminary tracheostomy under local anesthesia, without prior intubation. Oxygen must be administered continuously during operation. It is better to restrain the patient than to sedate him. The airway must be under full control from beginning to end of the procedure. Barring this, it may be well to wait a few days after tracheostomy before going on with radical removal.

I. W. VORHEES, New York.

RESIDUAL ATOMIC BOMB INJURY IN OTOLARYNGOLOGICAL REGION. T. GOTO and J. MURASHIMA, Jap. J. Otol. 58:10, 1955.

Observations on 1857 who were subjected to the Nagasaki atomic bombardment were recorded by Goto and Murashima. These had experienced the bombing in 1945. They were located from 1 to 2 kilometers from the hypocenter.

1. Of these 91 had residues of injury in the ear, nose, and throat. Most of these cases had also cataract as well as keloid formation on some other part of the body. No otolaryngological disturbances were found in those who had stayed at 3 kilometers or farther from the hypocenter.

2. In 36 cases there was atrophic deformity of the external ear due to burns and perichondritis.

3. Seven had perforated tympanic membrane, 13 showed scars in their ear drums and 5 had developed chronic suppurative otitis media.

4. Hearing impairment was found in 19, all suffering from conductive deafness.

5. No inner ear disturbance was noted.

6. Nasal injuries were extremely rare.

7. Nine had cicatrix in mouth and pharynx.

8. One case was fitted with tracheal tube on account of laryngeal stenosis caused by chondritis.

HARA, Los Angeles.

ELECTROMYOGRAPHIC STUDIES OF THE CERVICAL MUSCLES BEFORE AND AFTER DISSECTION OF THE NECK. AKIHISA UYAMA, Otologia Fukuoka (Supp.) 3:1-16 (March 15) 1957.

Unilateral radical neck dissection was performed in 33 cases of carcinoma of the larynx and 10 cases of carcinoma of the superior maxilla and of the tongue.

Electromyographic study of the M. sternocleidomastoideus, M. trapezius, and M. splenius capitis were performed before and after the neck dissection to determine their functioning.

Ten normal persons were used for control. Uyama came to the following conclusions:

1. There was no motor disturbance noted after a unilateral partial resection of M. sternocleidomastoideus.

2. The electric potential of the remaining part of the M. sternocleidomastoideus elicited a smaller spike after the operation than before. It is assumed that the M. splenius co-operated

with the M. sternocleidomastoideus on the side of operation so as to compensate the partial loss of the M. sternocleidomastoideus.

3. M. trapezius and M. sternocleidomastoideus give off abnormal spikes when accessory nerve is impaired. Cervical nerves number II-IV also innervate M. sternocleidomastoideus, thus impairment of the cervical nerves is indicated by the wave of complex neuromuscular unit voltage.

4. Clinically, M. trapezius was found impaired in no more than 40% of cases after a radical neck dissection. Thus, when this operation is performed with reasonable care, there is no muscular or other impairment in any considerable number of cases.

The author pleads that radical neck dissection should be much more frequently performed for its prophylactic value than for its therapeutic effect.

HARA, Los Angeles.

News and Comment

ANNOUNCEMENTS

International Congress on Logopedics and Phoniatrics.—The 11th Congress of the International Association of Logopedics and Phoniatrics will take place in London, Aug. 17-22, 1959.

The following official reports will be presented: "The Inheritance of Voice and Speech Disorders" by Prof. R. Luchsinger, M.D., Zurich; "Defects of Articulation" by Muriel Morley, B.Sc., F.C.S.T., Newcastle; "The Physiology and Pathology of the Soft Palate" by Prof. Lucio Croatto, M.D., Padua.

The official languages of the Conference will be English, French, and German.

Those working in the field of speech and voice therapy and all who are interested in this specialty are invited to attend and to submit papers.

If you intend to be present, whether submitting a paper or not, please inform the Congress Secretary at the earliest possible date. All communications should be sent to the Congress Secretary, Peggy Carter, L.C.S.T. 46 Canonbury Square, London, N. 1.

Subjects Needed for Experimental Studies.—The U. S. Naval School of Aviation Medicine is greatly interested in locating persons who have total loss of function of both inner ears either through bilateral labyrinthectomies or bilateral eighth nerve sections. These patients will be used in studies on the human centrifuge and rotational devices at Pensacola. There is no hazard and little or no discomfort. Healthy subjects between the ages of 18 and 50 can be used and will be paid $15 per day plus expenses.

The cooperation of any physicians in helping locate such persons will be greatly appreciated. Please address correspondence to Capt. Ashton Grabiel (MC), U. S. N., Director of Research, Naval School of Aviation Medicine, Naval Air Station, Pensacola, Fla.

American Cancer Society Fellowships.—The American Cancer Society has announced that Clinical Fellowships at the senior resident level for the academic year 1959-60 may be applied for by institutions accredited by the Council on Medical Education and Hospitals of the American Medical Association to give training in the following specialties and subspecialties, with emphasis on the diagnosis and treatment of cancer: internal medicine, malignant diseases, neurological surgery, obstetrics-gynecology, orthopedic surgery, otolaryngology, pathology, public health, radiology, surgery, and urology.

Institutions will be notified of awards granted in June, 1958. Individual candidates should apply directly to an institution, or to the American Cancer Society, for information concerning fellowships. The annual stipend, tax exempt, is $3600.

Application forms are available from the Director of Professional Education, American Cancer Society, Inc., 521 W. 57th St., New York 19.

Feb. 15, 1958, is the deadline for institutions submitting applications for the 1959-1960 clinical fellowships.

Books

BOOKS RECEIVED

Ciba Foundation Colloquia on Ageing, Volume 3: Methodology of the Study of Ageing. Edited by G. E. W. Wolstenholme,O.B.E., M.A., M.B., B.Ch., and Cecilia M. O'Connor, G.Sc. Price, $6.50. Pp. 202, with 47 Illustrations. J. & A. Churchill, Ltd., 104 Gloucester Place, Portman Sq. London W. 1. Little, Brown & Company, 34 Beacon St., Boston 6, 1957.

Anesthesia and Otolaryngology.* By Donald F. Proctor, M.D. Price, $7.00. Pp. 267, with 33 Illustrations. Williams & Wilkins Company, Mount Royal and Guilford Aves., Baltimore 2, 1957.

Diseases of the Nose and Throat.* Sixth Edition. By Sir St. Clair Thomson and Sir Victor E. Negus (Revised by Sir V. E. Negus, assisted by G. H. Bateman). Price, $15.50. Pp. 1040, with 399 Illustrations (including 13 color plates) Cassell & Co., Ltd., 37-38 St. Andrew's Hill, Queen Victoria St., London, E. C. 4. Cassell & Co., Ltd., Kingswood House, 1068 Broadview Ave., Toronto 6, 1955.

BOOK REVIEWS

Speech Disorders—Principles and Practice of Therapy. By Mildred Freburg Berry and Jon Eisenson. Price, $6.75. Pp. 562. Appleton-Century-Crofts, Inc., 35 W. 32nd St., New York 1, 1956.

This book is intended primarily to be used as a text "for a fundamental course in speech correction entailing six to eight semester hours of credit." The authors add, "We hope, of course, that doctors, nurses, psychologists, and parents of speech-handicapped children will find it a valuable source-book." The point of view of this book is expressed by the authors in this statement: "We present with equal emphasis the physiological and psychological bases of speech deviations, keeping in mind that therapy must be centered in the person, not in the symptom."

In this reviewer's opinion, this book more than meets its purported objectives. It is comprehensive in scope, including a section on esophageal speech; it is thorough in its coverage of each area, revealing an extensive review of the literature as well as insightful clinical experience, and it is written in a very clear style yet always at a high professional level. The citations from the literature are not only pertinent and up to date, but they are carefully evaluated and integrated into the text.

Four chapters in Speech Disorders impress the reviewer as especially commendable to otolaryngologists. Chapter 4, Pathways to Speech, presents an excellent discussion of the neurological basis of speech, and its pertinence to the etiology of speech disorders. Chapters 9 and 10, Voice Disorders (I and II), discuss the etiology of voice disorders from the standpoint of structural physiological, and psychological causation. It advocates a sound and sensible point of view with respect to the criteria for deviant voice function, recognizing an acceptable normal range of deviation and avoiding the stress upon "abnormal." There is an excellent discussion of the problem of nasal twang, which in many cases, the authors point out, cannot "be attributed to the nose."

Chapter 19 deals with "The Handicapped in Hearing." It embraces the hearing mechanism, the development of auditory acuity, types of hearing loss, relationship between hearing and speech, etc. The section on "measurement of hearing loss in the young child" exemplifies the sound professional point of view characteristic of the authors of this book. They state: "It must be understood that objective tests of hearing constitute but one part of the study of the total auditory behavior of the subject. In administering these tests, the student should keep in mind qualifications which we have discussed earlier, namely, that (1) pitch loudness, and duration are not the sole criteria of hearing for speech; (2) acuity for the pure tones of an audiometer does not assure acuity for the complicated noises and tones of speech; (3) the child may respond to faint sounds or to speech, but not to loud sounds; (4) he may feel the vibrations from a sounding body although he does not hear them; (5) his responses may be inconsistent from day to day; (6) he may hear speech sounds but be unable to interpret what he hears (receptive aphasia); and (7) he may hear but not respond because of an emotionally disturbed personality, or expressive aphasia, or mental deficiency."

* Will be reviewed.

At the end of the text is a series of five appendices presenting material on the peripheral speech mechanism, pathways to speech, diagnostic charts, clinical tests, and other materials of value to the speech therapist in the clinic.

This book can be recommended as authoritative source book for the various areas of speech pathology which comprise its text.

Exposés annuels d'Oto-Rhino-Laryngologie (Annual Report of Otorhinolaryngology from the College of the Hospital of Paris, Section of Otorhinolaryngology). Edited by R. Maduro and J. Bouche. Price, 1600 fr. Pp. 266, with 32 illustrations. Masson & Cie, 120 boulevard Saint-Germain, Paris, 6e, 1956.

This third volume in the annual series follows the general plan of the previous publications and includes original papers covering not only the field of otorhinolaryngology but also many allied subjects.

The subject matter is extremely wide, covering such problems as adenoid vegetations in infants, tonsillectomy and poliomyelitis, the diagnosis of infectious mononucleosis, postanginal rheumatism, the treatment of functional dysphasias, and otitic tuberculosis in infants. In addition there are papers on occupational deafness of toxic origin, diagnosis of otosclerosis, recent progress in the surgery of conductive deafness. There are also papers on pollenosis, carotid syndrome, malignant tumors of the rhinopharynx, roentgen diagnosis of tumors of the petrous pyramid, adamatinomas, and high-frequency radiotherapy in otorhinolaryngology.

The papers are well written and cover each subject in great detail. This volume is valuable in keeping the otolaryngologist up to date on many of the problems that occur in the specialty.

A. M. A. Scientific Exhibits. Sponsored by the Council on Scientific Assembly, American Medical Association. Price, $10.00. Pp. 411. Grune & Stratton, Inc., 381 Fourth Ave., New York 16, 1956.

This volume is a compilation of photographs of the scientific exhibits that were shown at the 1956 Convention of the American Medical Association. They represent exhibits which received awards or honorable mention. In addition there are descriptive paragraphs pertaining to all of the additional exhibits. Also included are a few commercial exhibits.

This book should satisfy a constant complaint of the physicians attending the convention, namely, that there is not enough time to study and evaluate the continuous progress in medicine. Now, they can review these exhibits at their leisure, and for greater detail and clarification they can request reprints or information from the exhibitors.

The concept of the book is excellent and should appeal to all in the field of medicine and surgery. The table of contents is subdivided into the various specialties, and the index has a list of the exhibitors. This book should be repeated for all future conventions.

Diseases of the Nose, Throat and Ear. Tenth Edition. By Howard Ballinger, M.D., F. A. C. S., Prof. Emeritus, Department of OtoLaryngology, Northwestern University Medical School, Chicago; Surgeon, Department of OtoLaryngology, Evanston Hospital, Evanston, Ill., and John Ballinger, B.S., M.S., M.D., Associate in Department of Otolaryngology, Northwestern University Medical School, Chicago; Associate Surgeon, Department of Otolaryngology, Evanston Hospital, Evanston, Ill. Price, $17.50. Pp. 968, with 550 illustrations (11 color plates). Lea & Febiger, 600 S. Washington Square, Philadelphia 6, 1957.

This 10th edition is very timely, since many changes have occurred in the field of otolaryngology in the 10 years that have elapsed since the appearance of the 9th edition.

The text has been rewritten or revised to include the newer developments. Particular stress is placed on the physiology of the nose, the Eustachian tube, and hearing. Emphasis is placed on inflammatory diseases of the labyrinth, its treatment, both medical and surgical, physiology and functional tests of the vestibular apparatus, Ménières syndrome, etc. The problems of allergy should have been more fully discussed.

Each subdivision of otolaryngology is carefully presented, with special emphasis on anatomy and physiology, the various diseases, their diagnosis and treatment, both medical and surgical. The surgical techniques are meticulously described and are supplemented with excellent illustrations depiciting the various stages of each surgical procedure.

Many sections have been completely rewritten, and all obsolete material has been eliminated from the text.

This book is an excellent reference book not only for the otolaryngologist but for all general practitioners.

Directory of Otolaryngological Societies *

FOREIGN AND INTERNATIONAL

Canadian Otolaryngological Society
(Société Canadienne d'Otolaryngologie)

President: Dr. Robert T. Hayes, 42 Cobourg St., St. John, N. B.
Secretary: Dr. Donald M. MacRae, 34 Spring Garden Rd., Halifax, N. S.
Place: Nova Scotian Hotel, Halifax, N. S. Time: June 9-11, 1958.

Venezuela Otorhinolaryngology Society

President: Dr. Alfredo Celis Pérez.
Secretary: Dr. Jesús Miralles.

International Bronchoesophagological Society

President: Dr. Jo Ono, Tokyo.
Secretary: Dr. Chevalier L. Jackson, 3401 N. Broad St., Philadelphia 40.
Meeting: Seventh International Congress of Bronchoesophagology.
Place: Kyoto, Japan. Time: Sept. 14-16, 1958.

International College of Surgeons, Section of Ophthalmology and Otolaryngology

President: Dr. Henry M. Scheer, 522 W. End Ave., New York 24.
Secretary: Dr. Louis Savitt, 3402 W. Lawrence Ave., Chicago 25.

International Congress of Audiology

General Secretary: Dr. H. C. Huizing, 182 Oostersingel, Groningen, Netherlands.
Place: Leyden, Netherlands.

International Course in Paedo-Audiology

General Secretary: Dr. H. C. Huizing, 182 Oostersingel, Groningen, Netherlands.
Place: Groningen, Netherlands.

Pan-American Association of Oto-Rhino-Laryngology and Broncho-Esophagology

President: Dr. José Gros, Havana, Cuba.
Secretary: Dr. Chevalier L. Jackson, 3401 N. Broad St., Philadelphia 40.
Meeting: Sixth Pan-American Congress of Oto-Rhino-Laryngology and Broncho-Esophagology.
Place: Brazil. Time: Aug. 12, 1958.

NATIONAL

American Medical Association, Scientific Assembly, Section on Laryngology, Otology and Rhinology

Chairman: Dr. Alden Miller, 500 S. Lucas Ave., Los Angeles.
Secretary: Dr. Hugh A. Kuhn, 112 Rimbach St., Hammond, Ind.
Place: San Francisco. Time: June 23-27, 1958.

American Academy of Ophthalmology and Otolaryngology

President: Dr. Erling W. Hansen, 90 S. Ninth St., Minneapolis.
Executive Secretary-Treasurer: Dr. William L. Benedict, 100-1st Ave. Bldg., Rochester, Minn.

American Board of Otolaryngology

President: Dr. Gordon D. Hoople, 1100 E. Genesee St., Syracuse 10, N. Y.
Secretary-Treasurer: Dr. Dean M. Lierle, University Hospitals, Iowa City.

* Secretaries of societies are requested to furnish the information necessary to keep this list up to date.

American Broncho-Esophagological Association

President: Dr. Walter Hoover, 605 Commonwealth Building, Boston.
Secretary: Dr. F. Johnson Putney, 1719 Rittenhouse Sq., Philadelphia 3.
Place: Mark Hopkins Hotel, San Francisco. Time: May 21-23, 1958.
Place: The Homestead, Hot Springs, Va. Time: March, 1959.

American Laryngological Association

President: Dr. Harry P. Schenk, 326 S. 19th St., Philadelphia 3.
Secretary: Dr. James H. Maxwell, University Hospital, Ann Arbor, Mich.
Place: Fairmont Hotel, San Francisco. Time: May 19-20, 1958.

American Laryngological, Rhinological and Otological Society, Inc.

President: Dr. Lawrence R. Boies, University Hospital, Minneapolis 14.
Secretary: Dr. C. Stewart Nash, 700 Medical Arts Bldg., Rochester 7, N. Y.
Place: Mark Hopkins Hotel, San Francisco. Time: May 21-23, 1958.
Place: The Homestead, Hot Springs, Va. Time: March, 1959.

SECTIONS:

Eastern.—Chairman: Dr. Chevalier L. Jackson, 3401 N. Broad St., Philadelphia 40.
Place: Hotel Warwick, Philadelphia. Time: Jan. 9-10, 1958.
Southern.—Chairman: Dr. Sam H. Sanders, 1089 Madison Ave., Memphis, Tenn.
Place: Peabody Hotel, Memphis, Tenn. Time: Jan. 25-26, 1958.
Middle.—Chairman: Dr. Francis L. Lederer, 860 N. Lake Shore Drive, Chicago.
Place: Hotel Morrison, Chicago. Time Jan. 13-14, 1958.
Western.—Chairman: Dr. Ben. R. Dysart, 960 E. Green St., Pasadena 1, Calif.
Place: Beverly-Hilton Hotel, Beverly Hills, Calif. Time: Jan. 18-19, 1958.

American Rhinologic Society

President: Dr. Walter E. Loch, 9 Beechdale Rd., Baltimore 10.
Secretary: Dr. Robert M. Hansen, 1735 N. Wheeler Ave., Portland, Ore.

American Otological Society, Inc.

President: Dr. Dean M. Lierle, State University of Iowa, Iowa City.
Secretary: Dr. Lawrence R. Boies, University Hospitals, Minneapolis 14.
Place: Fairmont Hotel, San Francisco. Time: May 17-18, 1958.
Place: The Homestead, Hot Springs, Va. Time: 1959.

American Otorhinologic Society for Plastic Surgery, Inc.

President: Dr. Armand L. Caron, 36 Pleasant St., Worcester, Mass.
Secretary: Dr. Louis Joel Feit, 66 Park Ave., New York 16.

American Society of Facial Plastic Surgery

President: Dr. Irvin J. Fine, 505 New Brunswick Ave., Perth Amboy, N. J.
Secretary: Dr. Samuel M. Bloom, 123 E. 83rd St., New York 28.

American Society of Ophthalmologic and Otolaryngologic Allergy

President: Dr. Sam H. Sanders, 1089 Madison Ave., Memphis 3.
Secretary-Treasurer: Dr. Michael H. Barone, 468 Delaware Ave., Buffalo 2.

Otosclerosis Study Group

President: Dr. Joseph A. Sullivan, 174 St. George St., Toronto 5, Canada.
Secretary-Treasurer: Dr. Arthur L. Juers, 611 Brown Building, Louisville.

Society of Military Otolaryngologists

President: Capt. William C. Livingood, U. S. N. (MC).
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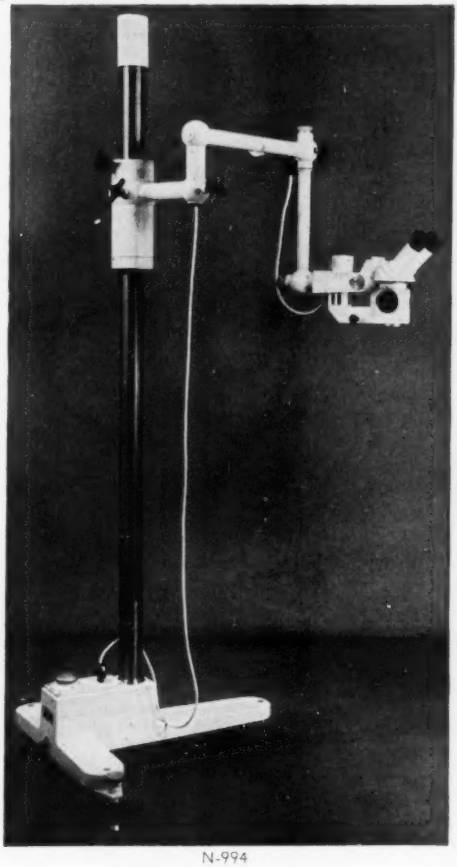

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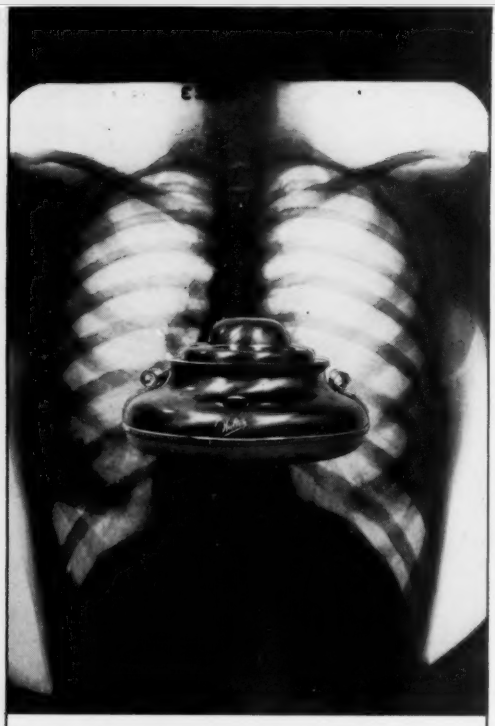

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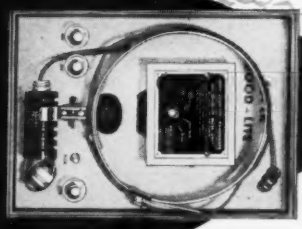

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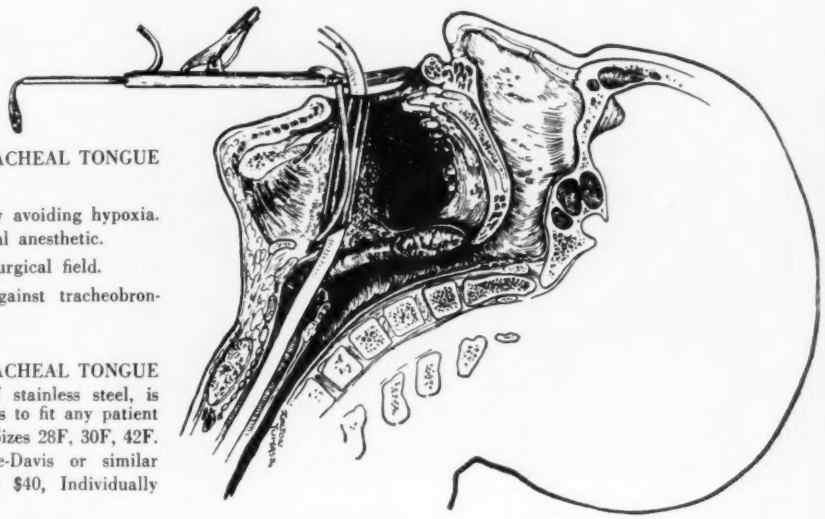

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*Barton, R. T.: Instrument for endotracheal anesthesia during oro-pharyngeal surgery. J. A. M. A. 153:1017 (Nov. 14) 1953.

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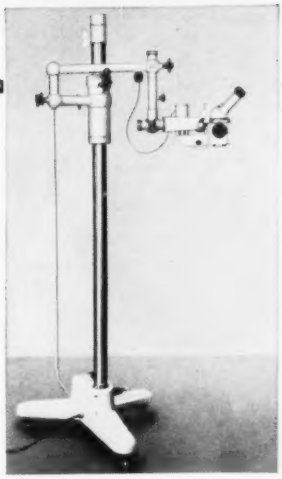

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